



MINTO COMMUNITIES CANADA

Quinn's Pointe Phase 2

Environmental Impact Statement

March 2018



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References

Executive Summary

Dillon Consulting Limited was retained by Minto Communities Canada (Minto) to complete an Environmental Impact Statement (EIS) for the proposed Quinn's Pointe Phase 2 development, generally located at the northwest corner of Barnsdale Road and Greenbank Road, in the City of Ottawa (the "Property"). The purpose of the EIS is to document existing conditions of the natural environment; determine the potential limits of development; evaluate the potential for environmental impacts associated with the proposed development; and recommend mitigation, restoration, and enhancement measures to preserve and/or restore natural features. The following is a summary of the determinations made in the EIS:

- 1) The Property does not contain any provincially significant wetlands, significant woodlands, significant valleylands, areas of natural and scientific interest, or significant wildlife habitat.
- 2) No watercourses were identified within the Property. However, the results from a Headwater Drainage Feature Assessment from 2015 and 2016 have been used to evaluate the potential impacts on the aquatic habitat of downstream receivers.
- 3) The groundwater function associated with the Kars Esker, located within the Property is part of the City of Ottawa's natural heritage system as defined in Section 2.4.2 of the City's Official Plan.
- 4) Two non-significant woodlands were identified within the Property, as well as a number of treed fencerows which contain generous species and size diversity. These are favourable characteristics for retention and integration into the future community and are generally associated with longer-lived tree species (e.g. maple, hickory, and oak).
- 5) One Barn Swallow (*Hirundo rustica*) which is a Species at Risk (SAR) listed as *Threatened* was observed as a flyover during 2015 field surveys within the Property. No other SAR or SAR habitat was identified within the Property boundaries.

1.0 Introduction

1.1 Purpose

Dillon Consulting Limited ("Dillon") was retained by Minto Communities Canada ("Minto") to complete an Environmental Impact Statement (EIS) for the proposed Quinn's Pointe Phase 2 development. The proposed development is located at the northwest corner of Barnsdale Road and Greenbank Road in the City of Ottawa (the "Property") (Figure 1).

The purpose of the EIS is to document existing conditions of the natural environment; determine the potential limits of development; evaluate the potential for environmental impacts associated with the proposed development; and recommend mitigation, restoration, and enhancement measures to preserve and/or restore natural features to be retained. The EIS has been prepared in general accordance with the City of Ottawa's ("the City") Environmental Impact Statement Guidelines (2015).

1.2 Property Information

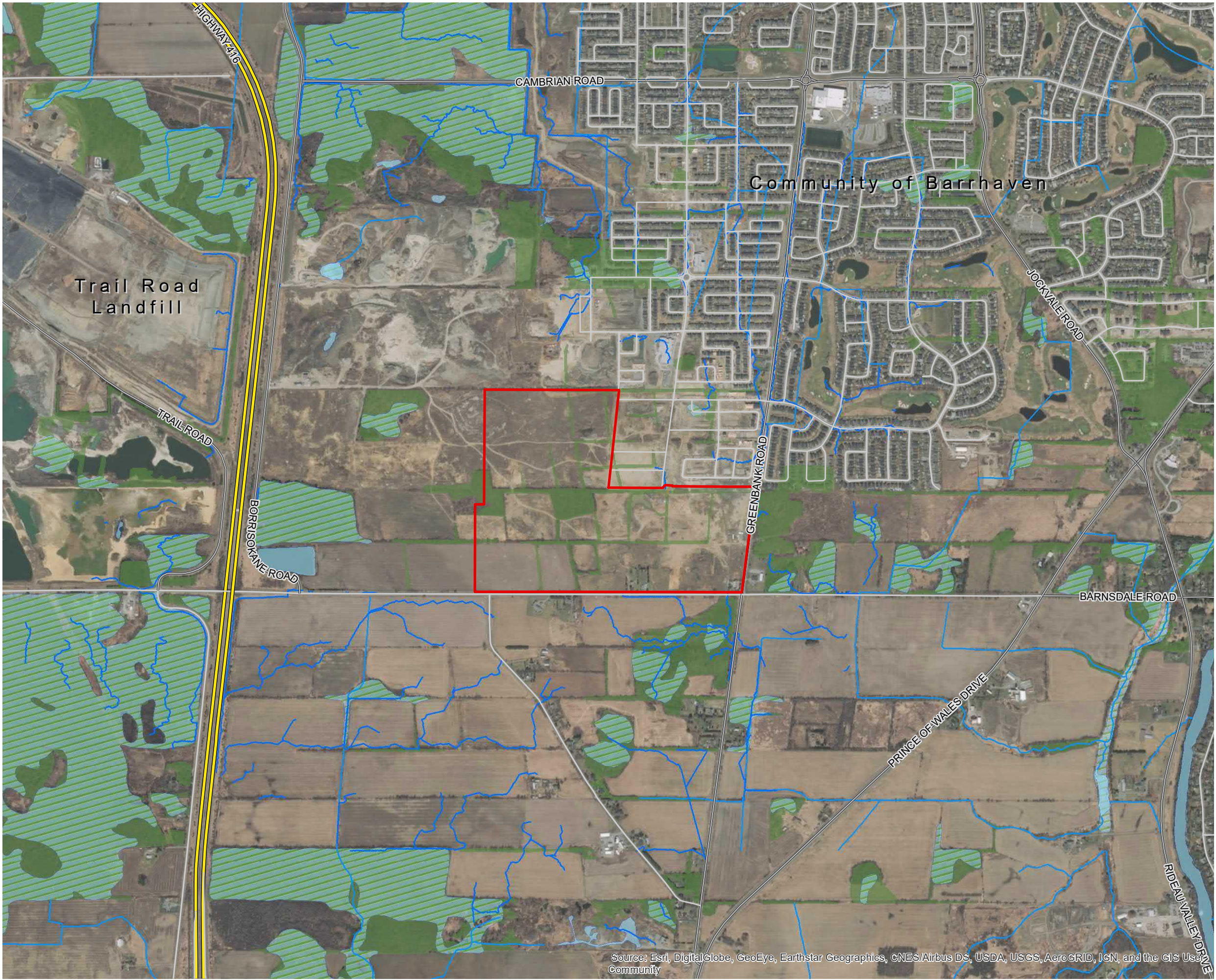
<i>Owner:</i>	Minto Communities
<i>Address:</i>	3882 Barnsdale Road; Rideau-Goulbourn Ward
<i>Lot and concession:</i>	Part Lot 6, 7 and 8, Concession 3
<i>Property Identification Number(s):</i>	045922105
<i>Zoning:</i>	Agricultural Zone, Rural Countryside Zone, Mineral Aggregate Reserve Zone
<i>OP designation:</i>	Urban Expansion Study Area, General Rural Area, Sand and Gravel Resource Area

Location

The Property is located in the community of Barrhaven South; bounded by Greenbank Road to the east and Barnsdale Road to the south.

Land Use and Zoning

The Property as an Urban Expansion Study Area, General Rural Area and a Sand and Gravel Resource Area in Schedule A of the City of Ottawa's Official Plan (*Appendix A*). The property is zoned as Mineral Aggregate Reserve Zone (MR, MR1), Rural Area (RU), and Agricultural Zone (AG2).



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



QUINN'S POINTE STAGE 2
ENVIRONMENTAL IMPACT STATEMENT

STUDY AREA
FIGURE 1

- Property Boundary
- Freeway
- Major Road
- Road
- Utility Line
- Watercourse
- Waterbody
- Wetland
- Wooded Area

0 75 150 300 m

SCALE 1:15,000



MAP DRAWING INFORMATION:
DATA PROVIDED BY MNR

MAP CREATED BY: LK
MAP CHECKED BY: WM
MAP PROJECTION: NAD 1983 UTM Zone 18N



PROJECT: 15-1769
STATUS: DRAFT
DATE: 2018-03-05

2.0

Policy Framework

Various regulatory agencies and legislative authorities have established a number of governing policies in an effort to protect ecological features and functions. Table 1 lists the policies and legislation that apply to the protection of natural heritage features within the Ottawa area and supporting guidance documents and resources respective to each policy. The scope of this report evaluates the natural features governed by the policies outlined in Table 1.

TABLE 1: POLICIES, LEGISLATION AND BACKGROUND RESOURCES SEARCHED

Policy / Regulations	Guidelines and Supporting Documents
Federal Government of Canada	
Migratory Birds Convention Act (1994)	Environment and Climate Change Canada
Species at Risk Act (2002)	Federal Species at Risk Public Registry, accessed November 2017
Species at Risk Act (2002)	Fisheries and Oceans Canada (DFO) <i>Distribution of Fish Species at Risk mapping July 2017</i>
Province of Ontario	
Provincial Policy Statement (2014)	Ministry of Natural Resources and Forestry (MNRF) Kemptville District Main Contact: Aaron Foss, Fish and Wildlife Technical Specialist <i>Records requested directly from MNRF Kemptville District relating to natural features and wildlife species (Appendix B)</i>
	MNRF Natural Heritage Information Centre (NHIC) <ul style="list-style-type: none"> • <i>Species of Conservation Concern</i> • <i>Species at Risk</i> • <i>Natural heritage features</i>
	Ecological Land Classification for Southern Ontario, First Approximation and its Application 2008
	Natural Heritage Reference Manual, Second Edition, 2010
	MNRF Significant Wildlife Habitat Technical Guide (2000) <i>Significant Wildlife Habitat Eco-region 6E Criterion Schedules, 2015</i>
	Ontario Reptile and Amphibian Atlas- online data accessed December 2017
	Ontario Butterfly Atlas- online data accessed December 2017
	Ontario Breeding Birds Atlas (OBBA) - online data accessed December 2017
Ontario <i>Endangered Species</i>	Atlas of the Mammals of Ontario
	MNRF Species at Risk in Ontario (SARO) List (O.Reg. 230/08), December

Policy / Regulations	Guidelines and Supporting Documents
Act (2007)	<p>2017</p> <p>MNRF Kemptville District Main Contact: Aaron Foss, Fish and Wildlife Technical Specialist <i>Received Species at Risk occurrence records</i></p> <p>MNRF NHIC <i>Species at Risk occurrence records</i></p> <p>Ontario Breeding Birds Atlas (OBBA)- accessed online December 2017</p> <p>Ontario Reptile and Amphibian Atlas- online data accessed online December 2017</p>
City of Ottawa	
City of Ottawa Official Plan (2014)	<p>Schedules A, B, K, and L2, consolidated to 2014</p> <p>City of Ottawa's "geoOttawa" online mapping service</p> <p>Environmental Impact Statement Guidelines, 2nd Edition (2012)</p> <p>Protocol for Wildlife Protection During Construction (2015)</p> <p>Jock River Reach 1 Subwatershed Plan (2007)</p> <p>Mud Creek Subwatershed Study (2016)</p>
Conservation Authority	
Conservation Authorities Act, Ontario Regulation 174/06	<p>Rideau Valley Conservation Authority (RVCA)</p> <ul style="list-style-type: none"> • <i>Floodplain mapping</i> • <i>Lower Rideau Subwatershed Report 2012</i> • <i>Evaluation, Classification and Management of Headwater Drainage Features Guidelines (2014)</i> • Lower Rideau Subwatershed Report (RVCA, 2012) • Rideau River – Hogs Back Catchment Report (RVCA, 2012) • Jock River Subwatershed Report (RVCA, 2010) • Jock River Barrhaven Catchment Data Sheet (RVCA, 2010) • Rideau River Hogsback Catchment Report (RVCA, 2012) • Jock River Reach 1 Subwatershed Study (Stantec, 2007)

3.0

Natural Heritage Background Screening

A desktop review of the area indicates that the Property is primarily comprised of agricultural lands with recent development to the north along Greenbank Road. There are a few woodlands and fencerows evident in aerial photos within the Property. A review of available historic aerial photos indicates that the land use within the Property has remained the same since at least 1976 (Figure 2).



Figure 2: Land Use Changes Over Time

The following section provides a brief summary of the existing environmental conditions within the Property. This information provides the background information upon which the EIS is based.

3.1

Landforms, Soils and Geology

Mapping produced by the Ministry of Northern Development and Mines (1991) shows that the Property lies over Lower Ordovician bedrock consisting of dolostone and sandstone. Natural Resources Canada mapping, sourced from the Geological Survey of Canada, shows that the

bedrock in this area consists of dolomite of the Oxford formation with an overburden drift thickness of 15 to 25 m (Paterson 2016).

The physiography of the area is described as sand plain, clay plain, and esker (MNRF 1984). The Canada Department of Agriculture (1976) describes the soils within the Property as:

- slightly acidic to neutral, gravelly and cobbly coarse to moderately coarse textured, glaciofluvial materials and fossiliferous marine beach deposits;
- very strong to strongly acidic, coarse textured, marine and estuarine materials;
- mildly alkaline, moderately coarse to medium textured, stony, glacial till, and fossiliferous beach deposits; and
- areas of gravel pit, sand pit, and topsoil removal.

Test pits in the Property, undertaken by Paterson (2016), were noted to consist of sandy topsoil, or fine grained soil, with significant root matting followed by a predominantly coarse-grained deposit of glacial till, silty fine sand and/or sandy silt.

For additional information on geotechnical work completed within the Property, please refer to the Geotechnical Investigation prepared by Paterson (2016).

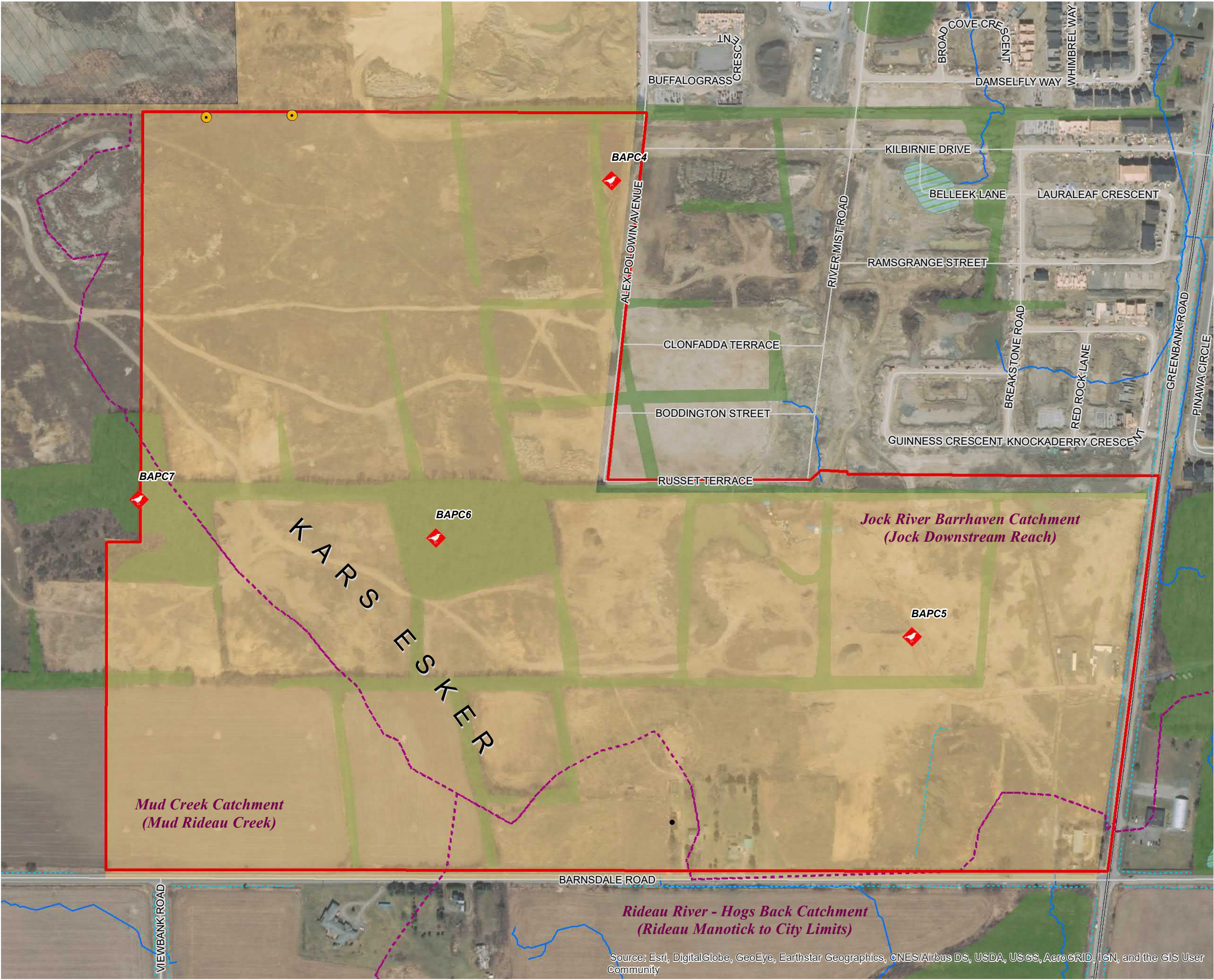
3.2 Aquatic Environment

For the purposes of this report, the Aquatic Environment is defined as surface and groundwater features that contribute to the overall water balance within the subwatershed(s) occupied by the Property. Surface water and groundwater functions within the Property are discussed in sections below.

3.2.1 Surface Water

The Property lies within the RVCA's jurisdiction and drains two subwatersheds delineated by the Conservation Authority: the Lower Rideau River and the Jock River. Within the Jock River Subwatershed, the Property is drained to the north by the Jock River- Barrhaven Catchment. Within the Lower Rideau River Subwatershed, the Property is drained to the southwest by the Mud Creek- Greens Creek Catchment and to the southeast by the Rideau River- Hogs Back Catchment (Figure 3).

Recent GIS mapping updates by the City has refined these catchment area boundaries and offers slightly different naming conventions, indicated in Table 2, below.



QUINN'S POINTE STAGE 2 ENVIRONMENTAL IMPACT STATEMENT

SURVEY LOCATIONS FIGURE 3

- Study Area
- Urban Ditch
- Major Road
- Road
- Watercourse
- Breeding Bird Survey
- Snake Basking Survey
- Wetland
- Wooded Area
- ELC, Vegetation, Headwaters, and Tree Inventory Area
- Active Aggregate Extraction Area - Not Surveyed
- Sub Watershed Boundary

0 25 50 100 m SCALE 1:4,000



MAP DRAWING INFORMATION:
DATA PROVIDED BY MNR, CITY OF OTTAWA

MAP CREATED BY: LK
MAP CHECKED BY: WM
MAP PROJECTION: NAD 1983 UTM Zone 18N



PROJECT: 15-1769
STATUS: DRAFT
DATE: 2018-03-05

TABLE 2: SUBWATERSHED NAMING CONVENTIONS

RVCA	City of Ottawa
Jock River- Barrhaven	Jock Downstream Reach
Mud Creek- Greens Creek	Mud Creek Rideau
Rideau River- Hogs Back	Rideau Manotick To City Limits

It should be noted that for the purposes of this report, the RVCA naming conventions have been used; however, in an effort to maintain consistency with other reports (e.g., Hydrogeological Investigation, Paterson (2016)), the City's refined subwatershed boundaries have been included in the figures.

JOCK RIVER- BARRHAVEN CATCHMENT

The Jock River originates southwest of the Property as headwater wetlands in Beckwith and Montague Townships and flows northeast through predominately-agricultural lands and urban communities at the south end of Ottawa and discharges to the Rideau River north of Manotick (MMM Group, 2013). The Jock River subwatershed drains an area of 555 km². Surface water quality varies across the Jock River ranging from "Poor" to "Good" (RVCA, 2010). Within this catchment, the Jock River's quality is rated as "Fair" as determined by the CCME Water Quality Index (RVCA, 2010).

The Jock River is a warm/cool water fishery with 37 fish species observed (Table 3).

TABLE 3: FISH SPECIES RECORDED WITHIN THE SUBWATERSHEDS

Scientific Name	Common Name	SRank ¹	SARA ²	ESA ³	JOCK RIVER ⁴	MUD CREEK ⁵	HOGS BACK ⁶
<i>Fundulus diaphanous</i>	Banded Killifish	S5	---	---	•		•
<i>Notropis heterodon</i>	Blackchin Shiner	S4	---	---	•	•	
<i>Notropis heterolepis</i>	Blacknose Shiner	S5	---	---	•		
<i>Pomoxis nigromaculatus</i>	Black Crappie	S4	---	---	•		•
<i>Lepomis macrochirus</i>	Bluegill	S5	---	---	•	•	•
<i>Pimephales notatus</i>	Bluntnose Minnow	S5	---	---	•	•	•
<i>Hybognathus hankinsoni</i>	Brassy Minnow	S5	---	---	•		
<i>Labidesthes sicculus</i>	Brook Silverside	S4	---	---	•		•
<i>Culaea inconstans</i>	Brook Stickleback	S5	---	---	•	•	•
<i>Ameiurus nebulosus</i>	Brown Bullhead	S5	---	---	•		•
<i>Umbra limi</i>	Central Mud Minnow	S5	---	---	•	•	•
<i>Ictalurus punctatus</i>	Channel Catfish	S4	---	---			•
<i>Cyprinus carpio</i>	Common Carp	SNA	---	---	•	•	•
<i>Luxilus cornutus</i>	Common Shiner	S5	---	---	•	•	•

Scientific Name	Common Name	SRank ¹	SARA ²	ESA ³	JOCK RIVER ⁴	MUD CREEK ⁵	HOGS BACK ⁶
<i>Semotilus atromaculatus</i>	Creek Chub	S5	---	---	•	•	
<i>Etheostoma spp.</i>	Darter Species	---	---	---		•	
<i>Hybognathus regius</i>	Eastern Silvery Minnow	S2	---	---			•
<i>Semotilus corporalis</i>	Fallfish	S4	---	---	•	•	•
<i>Pimephales promelas</i>	Fathead Minnow	S5	---	---	•	•	
<i>Phoxinus neogaeus</i>	Finescale Dace	S5	---	---	•		
<i>Notemigonus crysoleucas</i>	Golden Shiner	S5	---	---	•	•	
<i>Moxostoma valenciennesi</i>	Greater Redhorse	S3	---	---	•		•
<i>Etheostoma nigrum</i>	Johnny Darter	S5	---	---	•		•
<i>Micropterus salmoides</i>	Largemouth Bass	S5	---	---			•
<i>Rhinichthys cataractae</i>	Longnose Dace	S5	---	---	•	•	
<i>Percina caprodes</i>	Logperch	S5	---	---	•		•
<i>Notropis volucellus</i>	Mimic Shiner	S5	---	---	•		
<i>Cottus bairdi</i>	Mottled Sculpin	S5	---	---	•	•	•
<i>Esox masquinongy</i>	Muskellunge	S4	---	---	•	•	•
<i>Esox lucius</i>	Northern Pike	S5	---	---	•		•
<i>Phoxinus eos</i>	Northern Redbelly Dace	S5	---	---	•	•	
<i>Margariscus margarita</i>	Pearl Dace	S5	---	---	•		
<i>Lepomis gibbosus</i>	Pumpkinseed	S5	---	---	•	•	•
<i>Ambloplites rupestris</i>	Rock Bass	S5	---	---	•	•	•
<i>Moxostoma macrolepidotum</i>	Shorthead Redhorse	S5	---	---	•		•
<i>Moxostoma anisurum</i>	Silver Redhorse	S4	---	---	•		•
<i>Micropterus dolomieu</i>	Smallmouth Bass	S5	---	---	•	•	•
<i>Notropis hudsonius</i>	Spottail Shiner	S5	---	---	•	•	
<i>Noturus gyrinus</i>	Tadpole Madtom	S4	---	---			•
<i>Etheostoma olmstedii</i>	Tessellated Darter	S4	---	---			•
<i>Percopsis omiscomaycus</i>	Trout-perch	S5	---	---	•		
<i>Sander vitreus vitreus</i>	Walleye	S5	---	---	•		•
<i>Catostomus commersoni</i>	White Sucker	S5	---	---	•	•	•
<i>Ameiurus natalis</i>	Yellow Bullhead	S4	---	---			•
<i>Perca flavescens</i>	Yellow Perch	S5	---	---		•	•

¹ Provincial (Subnational) Rank; ² Federal *Species at Risk Act*; ³ Ontario *Endangered Species Act* (2007); ⁴ Fish species observed within subwatershed tributaries and the Jock River between 1992-2005 as reported in Table

3.9.4 of the Jock River Reach One Subwatershed Study Final Report (2007); ⁵Mud Creek Subwatershed Study (City of Ottawa, 2015); ⁶Rideau River Hogsback Catchment Report (RVCA, 2012); --- denotes no information.

MUD CREEK- GREENS CREEK CATCHMENT

Mud Creek originates south of Brophy Road, west of Highway 416, and flows southeast and northeast through predominantly agricultural lands to discharge to the Rideau River in Manotick (MMM Group, 2013). The Mud Creek Catchment only drains a small area in the southwestern part of the Property. However, the entire Mud Creek catchment drains an area of 52 km². Water quality within the Mud Creek Catchment ranges from “Fair” to “Poor” as determined by the CCME Water Quality Index (RVCA, 2012).

The Mud Creek Subwatershed Study (City of Ottawa, 2015) provides the following summary:

- Water temperatures were relatively cool (less than 22°C) across the subwatershed and very cool (less than 18°C) east of First Line Road, due to the groundwater influence of the Kars Esker;
- The Kars Esker plays a significant role in groundwater supply and maintenance of base flows in watercourses;
- 64 km (60%) of streams are municipal drains; and,
- Most of the recharge to the bedrock aquifer occurs along the Kars Esker.

The overall characterization of Mud Creek is a cold/cool water system with 22 fish species observed (Table 2).

RIDEAU RIVER-HOGS BACK CATCHMENT

The Rideau River-Hogs Back Catchment drains into two small areas along the southern boundary of the Property. This catchment area is mostly urbanized with several residential developments along the shoreline of the Rideau River. However, between the Property and the Rideau River, the area is mostly rural with only small portion within the urban boundary. This catchment drains into 38 km² of land and contains seven municipal drains. Water quality within this catchment is considered “Good” as determined by the CCME Water Quality Index (RVCA, 2012).

The Rideau River- Hogs Back Catchment contains warm/cool water recreational and baitfish fishery with 31 fish species observed (Table 2).

Watercourses within the area receive flow from surface run-off, agricultural tile drains, the Kars Esker, and groundwater features. Several ponds are present to the west and northwest of the Property; however, these are man-made features for aggregate uses which have naturalized over time or are associated with quarry excavations (MMM Group, 2013). Most channels have been realigned to skirt farm fields, creating watercourses that travel along property boundaries within uniform, straight, trapezoidal channels (MMM Group, 2013).

Background mapping suggests there is potential for agricultural ditches within the Property flowing into the Jock River and Lower Rideau River subwatersheds that may provide fish habitat for part of the year.

3.2.2

Groundwater

The Property lies over the Kars Esker, which functions as an important groundwater recharge area and is recognized in the Mississippi-Rideau Source Protection Plan as a highly vulnerable aquifer (City of Ottawa, 2016) and a Significant Groundwater Recharge Area under the Ontario Clean Water Act (2006).

In addition, The Mud Creek Subwatershed Study (City of Ottawa, 2015) indicates that some of the water infiltrating along the Kars Esker will discharge to the surface water. The report also indicates that the stream flow appears to be sustained at minimum level through dry periods; this further demonstrates the effect of groundwater flow from the esker.

For additional information on the Kars Esker and groundwater within Property please refer to the Hydrogeological Investigation prepared by Paterson (2016).

3.3

Natural Heritage Features

A number of natural heritage features require consideration for protection under the PPS and are administered by both the City and the Province of Ontario. These features are:

- Provincially Significant Wetlands (PSW);
- Significant woodlands;
- Significant valleylands,
- Areas of Natural and Scientific Interest (ANSI);
- Significant wildlife habitat;
- Habitat of Endangered and Threatened species; and,
- Fish habitat.

For the purposes of this report, habitat of endangered and threatened species has been included under Species at Risk (SAR) (Section 3.3.6); and fish habitat has been addressed within Section 3.2, Aquatic Environment, and will be included in under Aquatic Environment, herein.

3.3.1	<p>Wetlands</p> <p>No PSW's or unevaluated wetlands were identified within or adjacent to the Property (Figure 1). For the purposes of this report, 'adjacent' refers to lands within 120 m of the Property, herein.</p>
3.3.2	<p>Woodlands</p> <p>A review of aerial photos suggests that the Property contains two deciduous woodlands (Figure 1). A review of aerial photography from 1976 provides evidence for age estimation of the woodlots.</p> <ul style="list-style-type: none"> • The 1976 aerial photo illustrates that the east woodlot (Woodland B) contains mature trees suggesting it is more than 50 years old. The current size of the woodlot is 2 ha. • The 1976 aerial photo illustrates that the west woodlot (Woodland A) contained few mature trees at that time, suggesting it is between 40 and 50 years old. The current size is 1.9 ha. <p>Significance of woodlands is discussed further in Section 5.2.4.</p>
3.3.3	<p>Valleylands</p> <p>No significant valleylands were identified within or adjacent to the Property.</p>
3.3.4	<p>Areas of Natural and Scientific Interest</p> <p>No ANSIs were identified within or adjacent to the Property.</p>
3.3.5	<p>Significant Wildlife Habitat</p> <p>The Significant Wildlife Habitat Technical Guide (MNRF, 2000) defines types of significant wildlife habitats within Ontario. Furthermore, the Significant Wildlife Habitat Technical Guide Eco-Region 6E Criterion Schedules (MNRF, 2015), define and provide methods for evaluating significant wildlife habitat specific to Eco-region 6E, in which the Property is located. In accordance with the Eco-Region 6E Criterion Schedules (MNRF, 2015), a review of background data suggests that the following types of significant wildlife habitat may be present within or adjacent to the Property:</p> <ul style="list-style-type: none"> • Bat maternity colonies; • Reptile hibernaculum; and, • Habitat for rare and sensitive wildlife species. <p>As described in the Significant Wildlife Habitat Technical Guide (MNRF, 2000), Habitat for rare and sensitive wildlife species includes habitat for Species of Conservation Concern that do not fall under other defined significant wildlife habitat types. The MNRF has defined Species of Conservation Concern as globally, nationally, provincially, regionally, or locally rare (S-Rank of</p>

S2 or S3); and federally endangered and threatened SAR; but does not include SAR listed as endangered or threatened under the provincial ESA, 2007.

A background review of several wildlife atlases and provincial databases suggest that several Species of Conservation Concern have the potential to occur within or adjacent to the Property, which should be considered under habitat for rare and sensitive wildlife species (Table 4).

TABLE 4: SPECIES OF CONSERVATION CONCERN IDENTIFIED WITHIN OR ADJACENT TO THE PROPERTY

Scientific Name	Common Name	ESA Status ¹	SRank ²	Information Source ³
<i>Carex formosa</i>	Awnless Graceful Sedge	---	S4	NHIC
<i>Chordeiles minor</i>	Common Nighthawk	SC	S4B	MNRF
<i>Contopus virens</i>	Eastern Wood-Pewee	SC	S4B	MNRF
<i>Ammodramus savannarum</i>	Grasshopper Sparrow	SC	S4B	OBBA
<i>Hylocichla mustelina</i>	Wood Thrush	SC	S4B	MNRF
<i>Lampropeltis triangulum</i>	Eastern Milksnake	---	S3	MNRF.
<i>Danaus plexippus</i>	Monarch	SC	S2N, S4B	MNRF, OBA

¹ – SAR in Ontario List under the provincial ESA, 2007; SC = Special Concern; ² – Ontario SRank; S4= Apparently Secure; S3 = Vulnerable; S2 = Imperiled; ³ – Information sources include: NHIC = MNRF Natural Heritage Information Centre, MNRF = Ministry of Natural Resources and Forestry, OBBA = Ontario Breeding Bird Atlas.

In addition, Eastern Wood-pewee, and Wood Thrush were identified and documented in proximity to the Property during field investigations from the Realigned Greenbank Road and Southwest Transit way Extension, Planning and Environmental Assessment Study, Environmental Study Report (City of Ottawa, 2014).

3.3.6

Species at Risk

A desktop review of available information sources identified a number of SAR listed as endangered and threatened under the provincial ESA, 2007 with potential to occur within the vicinity of the Property see Table 5.

TABLE 5: SPECIES AT RISK IDENTIFIED WITH POTENTIAL TO OCCUR WITHIN OR ADJACENT TO THE PROPERTY

Scientific Name	Common Name	ESA Status ¹	SRank ²	Information Source ³
<i>Juglans cinerea</i>	Butternut	END	S3?	MNRF
<i>Platanthera leucophaea</i>	Eastern Prairie Fringed Orchid	END	S2	MNRF
<i>Physconia subpallida</i>	Pale-bellied Frost Lichen	END	S2	MNRF
<i>Riparia riparia</i>	Bank Swallow	THR	S4B	MNRF, OBBA
<i>Hirundo rustica</i>	Barn Swallow	THR	S4B	MNRF, OBBA
<i>Dolichonyx oryzivorus</i>	Bobolink	THR	S4B	MNRF, NHIC, OBBA
<i>Sturnella magna</i>	Eastern Meadowlark	THR	S4B	MNRF, NHIC, OBBA
<i>Caprimulgus vociferus</i>	Eastern Whip-poor-will	THR	S4B	MNRF
<i>Myotis lucifugus</i>	Little Brown Myotis	END	S4	MWH
<i>Myotis leibii</i>	Eastern Small-footed Myotis	END	S2S3	MWH
<i>Myotis septentrionalis</i>	Northern Myotis	END	S3	MWH
<i>Pipistrellus subflavus</i>	Tri-colored Bat	END	S3?	MWH

¹ – SAR in Ontario List under the provincial ESA, 2007; THR = Threatened; END = Endangered; ² – Ontario SRank; S4= Apparently Secure; S3 = Vulnerable; S2 = Imperiled; ³ Information sources include: NHIC = MNRF Natural Heritage Information Centre, MNRF = Ministry of Natural Resources and Forestry, OBBA = Ontario Breeding Bird Atlas, MWH = Digital Distribution Maps of the Mammals of the Western Hemisphere, version 3.0.

No aquatic SAR (fish or mussels) have been identified within the Jock River, or Lower Rideau River subwatersheds during the field investigations for Lower Rideau Subwatershed Report (RVCA, 2012). In addition, no SAR were identified in available Fisheries and Oceans Canada (DFO) mapping.

However, Bobolink, Eastern Meadowlark, Barn Swallow, Bank Swallow, and Butternut were identified in a past Environmental Impact Statement for development lands north of the Property, prior to development, at 3872 Greenbank Road (McIntosh Perry, October 2014).

3.3.7

Species at Risk Habitat

A review of aerial photos of the Property was used to identify candidate SAR habitat based on habitat requirements defined by the MNRF. The woodlands, fencerows, and agricultural fields within the Property may provide habitat for:

- Barn Swallow;
- Bobolink;
- Eastern Meadowlark;

- Butternut; and,
- SAR bats.

The SAR habitat identified above is consistent with potential species identified in the MNRF's response to the Information Request (*Appendix B*) and with studies completed in previous years for lands adjacent to the Property (MMM Group, 2013).

3.4

Scope of Work

To evaluate potential natural features within the Property the several studies were required in accordance with the Terms of Reference (TOR) established with the City in 2015, as part of the Barrhaven South Urban Expansion Study Area Environmental Management Plan (*Appendix C*). Those studies relevant to the Quinn's Pointe Phase 2, as listed below, were used to inform the determinations made in this EIS.

Aquatic Environment

- Headwater Drainage Features (HDF) Assessment and downstream aquatic habitat assessment

Natural Heritage Features

- Ecological Land Classification (ELC)
 - Vegetation survey
 - Woodland delineation
- Significant wildlife habitat
 - Bat maternity colony assessment (snag search)
 - Snake basking surveys
 - Breeding bird surveys
- SAR
 - Butternut survey (completed with vegetation survey)
 - Barn Swallow nest search
 - SAR bat habitat assessment

Trees

- Tree Inventory

Incidental Wildlife

- Visual and auditory observations of wildlife during all field studies

Methodology for the studies listed above has been included in Section 4.0.

4.0

Methodology of Biophysical Inventory

Fieldwork for this EIS was conducted between fall 2014 and fall 2017 when weather conditions and timing were deemed suitable based on the survey protocols being implemented (Table 6). As mentioned, field work was completed as part of the Barrhaven South Urban Expansion Area Environmental Management Plan (March 2017); with one follow-up site reconnaissance visit in 2017 with staff from the City present to confirm ELC and flag trees for preservation.

TABLE 6: DATES AND TIMES OF FIELD SURVEYS

Date	Time	Personnel	Weather Conditions	Air Temp (°C)	Purpose of visit
Sept 24, 2014	08:00	M. Seabert	Clear, light breeze, no precipitation	22	ELC and Tree Inventory
Sept 25, 2014	08:30	M. Seabert	Clear, light breeze, no precipitation	24	ELC and Tree Inventory
Oct 16, 2014	09:00	M. Seabert	Mostly Cloudy, light precipitation	19	Tree Inventory
April 30, 2015	13:30	W. Moore; K. McLean	Sunny, Clear, light breeze, no precipitation	12	HDF Assessment #1
May 26, 2015	08:28	J. Harris	Cloudy, light breeze, no precipitation	22	Breeding Bird Survey #1, Incidental Wildlife
June 17, 2015	06:58	J. Harris	Cloudy, light breeze, no precipitation	12	Breeding Bird Survey #2, Incidental Wildlife
June 26, 2015	11:30	R. Baxter	Mostly Clear, light breeze, no precipitation	23	ELC and Summer Vegetation Inventory
July 28, 2015	13:30	W. Moore; K. Robinson	Sunny, no precipitation	25	HDF Assessment #2
August 11, 2015	09:45	M. Wolosinecky	Cloudy, slight breeze, heavy precipitation	19	Tree Survey
September 28, 2015	11:00	M. Wolosinecky	Overcast, light rain.	19	Fall Vegetation Inventory and Snag Density Survey
March 21, 2016	09:00	W. Moore; K. Robinson	Sunny, no precipitation, melting snow	-2	Aquatic Habitat Assessment #1A
March 23, 2016	09:00	W. Moore; K. Robinson	Slightly overcast, no precipitation, melting snow	-1	Aquatic Habitat Assessment #1B
June 30, 2016	13:30	W. Moore; K. Cavanagh	Sunny, warm, no precipitation	20	Aquatic Habitat Assessment #2

Date	Time	Personnel	Weather Conditions	Air Temp (°C)	Purpose of visit
September 29, 2016	12:00	K. Robinson	Clear, moderate breeze, no precipitation	17	Survey of Fencerows & Snakes Habitat Survey
October 6, 2016	13:30	A. Zeller	Clear, moderate breeze, no precipitation	18	Woodlot Survey
October 27, 2016	14:00	A. Zeller K. Robinson	Clear, light breeze, no precipitation	21	Snake Basking Survey
October 31, 2017	15:30	A. Zeller	Partly Cloudy, no breeze, no precipitation	5	Tree retention identification, ELC validation

The following sub-sections outline the survey methodologies used in the EIS.

4.1 Aquatic Assessment

4.1.1 Surface Water and Ground Water

As part of the field work conducted for the Environmental Management Plan, two separate assessments were completed: a standard HDF Assessment within the Property, and a downstream aquatic habitat assessment at predetermined stations (roadside crossings) within the watershed, outside of the Property boundary.

The purpose of the first assessment was to evaluate potential watercourses within the Property boundary to determine constraints, following the criteria in the *Evaluation, Classification and Management of Headwater Drainage Features* (Toronto Region Conservation Authority and Credit Valley Conservation 2014), based on requirements from the RVCA. In accordance with the 2014 guidance document, the assessment comprised a review of background documents and data as well as subsequent site visits to collect field data regarding the flow, channel form, aquatic habitat, and vegetation of potential HDFs. This assessment has been included in in *Appendix D*.

The second aquatic habitat assessment was scoped in consultation with the RVCA to establish a baseline condition for receivers downstream of the Property in 2016. During the downstream aquatic habitat assessment, predetermined water crossings were chosen for evaluation based on hydrological connectivity to the Property. Data collected during this assessment, as well as a figure showing the locations of water crossings, has been included in *Appendix D*. This baseline condition was then used to evaluate the potential impacts this development may have on flows rates and associated downstream receivers. The specific parameters assessed included: stream flow, vegetation characteristics, channel form, sediment transportation or deposition,

the potential for fish and/or amphibian habitat, barriers to fish habitat, and other relevant characteristics.

Results of the aquatic assessments have been included in Section 5.1.

4.2 Natural Heritage Features

4.2.1 Ecological Land Classification

Vegetation was characterized using the ELC system for Southern Ontario (Lee et al., 1998) in order to describe and map ecological communities to the vegetation level. The ecological community boundaries were determined through the review of aerial photography and then further refined through on-site vegetation surveys. In addition to the vegetation survey, a soil assessment was conducted using a hand auger to identify the soil moisture class within the ecosystem.

The ELC protocol recommends that a vegetation community be a minimum of 0.5 ha in size before it is defined. Patches of vegetation less than 0.5 ha or disturbed/planted vegetation were described to the community level only. In some instances, where vegetation is less than 0.5 ha, but appears relatively undisturbed and clearly fits within an ELC vegetation type, the more refined classification was used.

4.2.2 Vegetation Inventory

Summer vegetation surveys were completed either in conjunction with ELC or as an independent survey within the Property. Surveys consisted of wandering transects and/or area searched to determine the presence, richness and abundance of floral species within and adjacent to the Property. Species nomenclature is based on the Ontario Plant List (Newmaster *et al.*, 1998).

4.2.3 Wetlands

The potential for wetlands to occur was investigated as part of the ELC survey.

4.2.4 Woodlands

The woodlands within the Property were investigated as part of the ELC work and Tree Inventory.

Significance of woodlands is discussed in Section 5.2.4.

4.2.5	Significant Wildlife Habitat
	Breeding bird and amphibian breeding surveys were undertaken to identify potential significant wildlife habitat and to provide a baseline assessment of the relative abundance of birds and amphibians within and adjacent to the Property.
4.2.5.1	Bat Maternity Colony Surveys
	<p>Surveys for snags and/or cavity trees were conducted in tandem with the Tree Inventory to determine the potential for bat maternity colonies within the Property. Methods employed included using a “wandering transect” to cover the entire wooded areas and fencerows to identify possible snags and/or cavity trees greater than 10 cm Diameter at Breast Height (DBH) suitable for bat maternity roosting.</p> <p>Results of snag surveys have been included in Section 5.2.5.1.</p>
4.2.5.2	Snake Hibernacula Survey
	<p>A snake habitat and basking survey was undertaken to determine if an abandoned stone wall and rock piles located within the northern-most fencerow, identified during an agency site walk, could provide significant wildlife habitat for snake hibernacula, as defined by the <i>Significant Wildlife Habitat Criteria Schedules for Ecoregion 6E</i> (MNRF 2015).</p> <p>A habitat search was done a week prior to the basking survey to identify potential survey stations without disrupting basking snakes and negatively impacting the survey results. During this habitat survey, incidental snake observations were noted and that information, along with the habitat observations, was used to locate the basking survey stations (Figure 3).</p> <p>The snake basking survey was completed in the fall of 2016, during a warm sunny day and involved surveying predetermined stations for snake presence. Each station was surveyed by standing for 30 minutes to observe snake activity. Following the survey at each station, the area was searched more thoroughly to look for snakes that may not have been observed.</p> <p>Results of snake basking surveys have been included in Section 5.2.5.2.</p>
4.2.5.3	Breeding Bird Surveys
	Diurnal breeding bird surveys conducted within the Property followed the methods outlined in the Ontario Breeding Bird Atlas Guide for Participants (Cadman et al 2007), and were completed in late June and early July of 2015 (two surveys). Specifically, breeding bird surveys consisted of ten minute point counts that were used to establish quantitative estimates of bird abundance in habitat types within the Property. Breeding bird surveys were conducted using point counts in proximity to woodland habitat within the Property (Figure 3). To supplement the surveys, area searches of the habitat were completed using binoculars to observe species

presence and breeding activity. Area searches involved noting all individual bird species and their corresponding breeding evidence while traversing the habitat on foot.

Results of breeding bird surveys have been included in Section 5.2.5.3.

4.2.6

Species at Risk

Preliminary findings suggested that the Property may provide marginal habitat for Bobolink and Eastern Meadowlark. However, during preliminary fieldwork in 2015, it was determined that areas identified as Bobolink and Eastern Meadowlark habitat by previous studies are no longer suitable for these species (e.g. the area where these species were observed in the 3872 Greenbank Road Report (McIntosh Perry, October 2014) is now developed). Furthermore, meadow and pasture habitat present in the area in 2013 had been converted to tilled agricultural fields with no vegetation growth or early successional forb meadow growth during the breeding bird season of 2015 and has been maintained as such (or in a similar state) since that time.

As a result, it was determined that specific surveys for Bobolink and Eastern Meadowlark were not warranted as habitat for these species no longer exists within the Property; however, surveys for Butternut, SAR Bats, and Barn Swallow should be undertaken, as detailed below.

4.2.6.1

Butternut

Surveys for Butternut were completed in conjunction with ELC and vegetation surveys within the Property.

4.2.6.2

Species at Risk Bats

Surveys for snags and/or cavity trees were conducted in tandem with the Tree Inventory to determine the potential for bat maternity colonies within the Property. Methods employed included using a “wandering transect” to cover the entire wooded areas and fencerows to identify possible snags and/or cavity trees greater than 10 cm DBH suitable for bat maternity roosting.

4.2.6.3

Barn Swallow

Surveys for Barn Swallows were completed in conjunction with diurnal breeding bird surveys and other field surveys in 2014 through 2017. In addition, the Property was searched for structures (i.e., barns, sheds, concrete box culverts, etc.) that could be suitable for Barn Swallow nesting.

4.3

Tree Inventory

Within the Property trees greater than 10 cm DBH were surveyed following the City's Tree Conservation Report (TCR) guidelines. Large stands of trees were assessed as a whole based on species composition and basal area as per standard ELC protocol. Larger Trees (50 cm DBH or greater), were surveyed by an approved professional as outlined in the City's guidelines. Trees surveyed within the Property that were exceptionally large (DBH > 80 cm) and were in good overall health were considered Specimen Trees. The survey for all Large Trees and Specimen Trees included the identification of species, DBH, condition, and location. Trees measuring less than 50 cm DBH were estimated based on their density, average size, and overall health.

The results of the Tree Inventory have been included in Section 5.3.

4.4

Incidental Wildlife

A wildlife assessment within the property was completed through incidental observations while on site. Any incidental observations of wildlife were noted, as well as other wildlife evidence such as dens, tracks, and scat. For each observation notes, and when possible, photos were taken. These observations also helped validate our conclusions on the ecological function of the Property.

5.0

Results of Biophysical Inventory

A biophysical inventory of natural features within the Property was completed in accordance with the methods detailed in Section 4.0. The analysis of data collected from secondary source information and during field studies in 2014, 2015 and 2017 was used to evaluate the significance of natural heritage features within the Property, in accordance with applicable guidelines and Provincial policies, as indicated in sections below.

5.1

Aquatic Environment

5.1.1

Surface Water

An HDF site visit occurred on April 30, 2015. The Property was surveyed to identify presence of watercourses and/or potential HDFs. The HDF assessment determined that there are no watercourses or HDFs present within the Property boundaries. Therefore, no fish habitat is present within the Property.

Although no surface water features are present within the Property, watercourses downstream of the Property receiving flow and other inputs (e.g., sediment) from runoff and/or groundwater from within the Property (herein referred to as "downstream receivers"); were found to contain fish and amphibian habitat or have the potential for fish habitat in the spring when water levels peak.

Potential impacts and mitigation measures regarding groundwater recharge functions in the Property are addressed in Section 7.1.2 and Section 8.2 respectively.

5.1.2

Groundwater

A review of background information covered in Section 3.3.2 found that infiltration from the Kars Esker provides important groundwater recharge functions for hydrological features within and adjacent to the Property boundaries. As no surface water features were identified within the Property, the importance of maintaining this infiltration and groundwater recharge function will be the focus of stormwater management methods developed for this proposed development.

Potential impacts of development and associated mitigation measures regarding the maintenance of groundwater recharge functions in the Property are addressed in in Section 7.1.2 and Section 8.2 respectively.

5.2 Natural Heritage Features

5.2.1 Ecological Land Classification

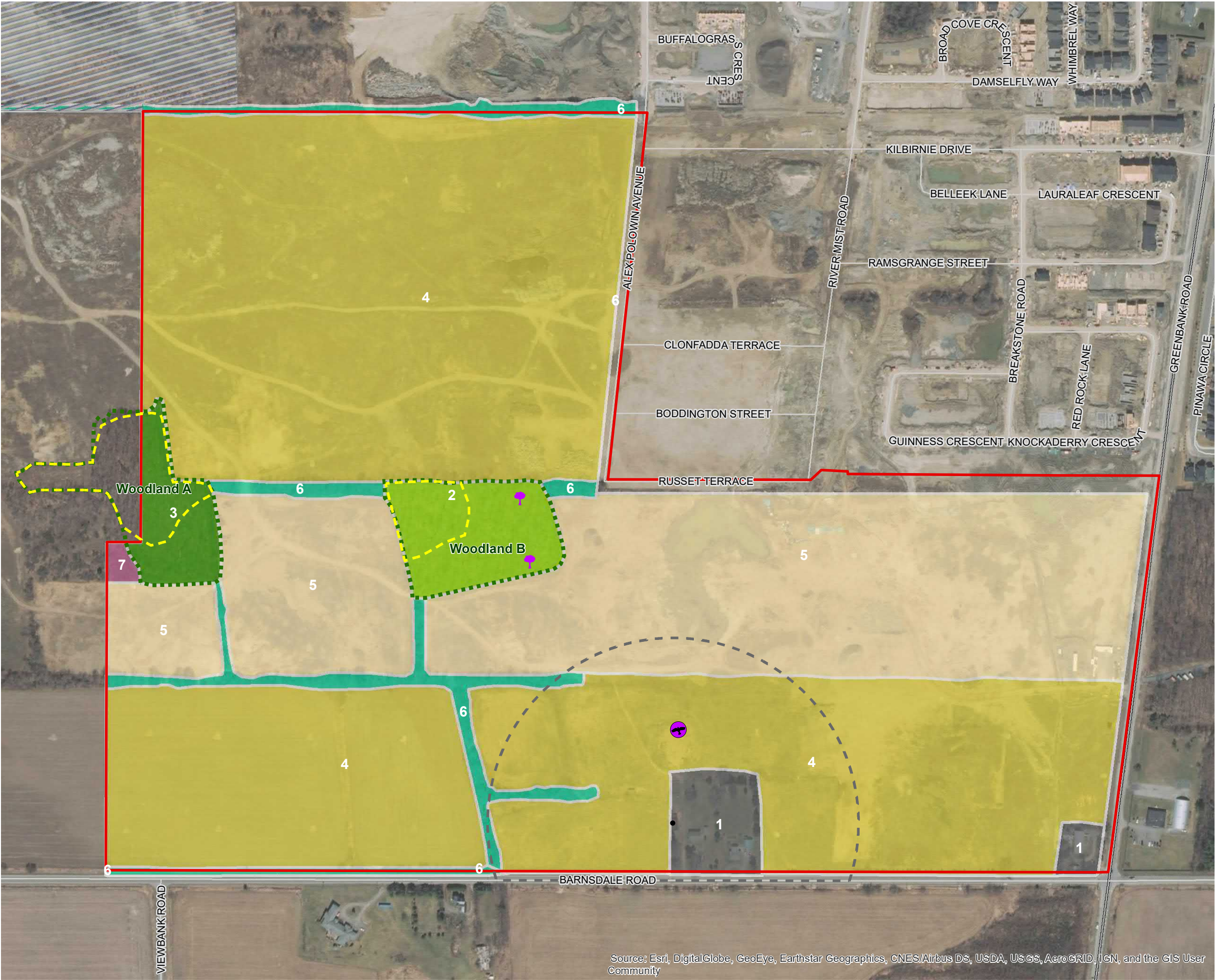
A total of seven vegetation communities were observed within the Property during the ELC survey, four of which are considered natural vegetation communities; including woodland (FODM4-2 & FODM5), regenerating forb meadow (MEFM1), and regenerating deciduous thicket (THDM1-1). The major land uses within the Property consist of tilled agricultural field ("cleared land") with treed fencerows (TAGM5). The location, type, and boundaries of the communities within the Property are delineated in Figure 4. All vegetation communities surveyed within the Property are considered common in Ontario. Table 7 outlines the communities documented during ELC surveys and summarizes the dominant vegetation cover. Reference photos for each ELC community observed can be found in *Appendix E*. A list of plant species observed during the field studies is included in *Appendix F*.

5.2.2 Vegetation Inventory

A total of 98 plant species were documented during 2014 and 2015 field studies. Of the 98 species, 57% are listed as native species considered to be common (S4) to very common (S5) in the province of Ontario; and 43% are listed as introduced species, therefore a status ranking is not applicable as the species is not a suitable target for conservation activities (SE or SNA rank). No SAR plants were observed.

The Co-efficient of Conservatism (CC) provides additional information on the nature of the vegetation communities within the Property. The CC values range from 0 to 10 and represent an estimated probability that a plant is likely to occur in a landscape that is relatively unaltered or is in a pre-settlement condition. For example, a CC of 0 is given to plants such as Manitoba Maple that demonstrate little fidelity to any remnant natural community, i.e. may be found almost anywhere. Similarly, a CC of 10 is applied to plants like Shrubby Cinquefoil (*Potentilla fruticosa*) that are almost always restricted to a pre-settlement remnant, i.e. a high quality natural area. Introduced plants were not part of the pre-settlement flora, so no CC values have been applied to these species.

Of the 98 species identified within the Property, one has a CC value of 7 or greater; Sheep Laurel (9). The mean CC value for the site was 3.2 out of a possible 10, indicating an altered landscape. This is typical of an urban environment as compared to naturally occurring environments. A full list of the vegetation species observed within the Property has been included in *Appendix F*.



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



QUINN'S POINTE STAGE 2

ENVIRONMENTAL IMPACT STATEMENT

ECOLOGICAL LAND CLASSIFICATION AND NATURAL HERITAGE FEATURES

FIGURE 4

- Property Boundary
- Major Road
- Road
- Ecological Land Classification**
 - 1. CVR_3: Single Family Residential
 - 2. FODM4-2: Dry-Fresh White Ash - Hardwood Deciduous Forest
 - 3. FODM5: Dry-Fresh Sugar Maple Deciduous Forest
 - 4. MEFM1: Regenerating Dry-Fresh Forb Meadow
 - 5. Cleared Land
 - 6. TAGM5: Fencerow
 - 7. THDM1-1: Native Mixed Regeneration
 - Aggregate Extraction Area
- Natural Heritage Features**
 - Non-Significant Woodland
 - High Quality Forest Community (as identified with City of Ottawa Staff)
 - Specimen Tree *
 - Barn Swallow Observation
 - Candidate Barn Swallow Nest Site
 - Potential Category 3 Barn Swallow Habitat

* Specimen Tree = Tree larger than 80 cm in diameter and in fair or good condition

0 25 50 100 m SCALE 1:4,000

MAP DRAWING INFORMATION:
DATA PROVIDED BY MNR
MAP CREATED BY: LK
MAP CHECKED BY: WM
MAP PROJECTION: NAD 1983 UTM Zone 18N



PROJECT: 15-1769
STATUS: DRAFT
DATE: 2018-03-05

TABLE 7: ECOLOGICAL LAND CLASSIFICATION

ID	ELC Code	Classification	Soils	Total Area within Property (ha)	Vegetation	COMMENTS	Photo Reference (Appendix E)
1	CVR_3	Single Family Residential	N/A	1.37	N/A		N/A
2	FODM4-2	Dry-Fresh White Ash – Hardwood Deciduous Forest Type	Loam (A Horizon); Fine Sandy Loam (B Horizon)	1.90	White Ash (<i>Fraxinus americana</i>) was the dominant tree species present with Manitoba Maple (<i>Acer negundo</i>), American Elm (<i>Ulmus americana</i>), American Basswood (<i>Tilia americana</i>), Wild Black Cherry (<i>Prunus serotina</i>), and Bitternut Hickory (<i>Carya cordiformis</i>) associates. Ground and shrub cover was dominated by Prickly Gooseberry (<i>Ribes cynosbati</i>) and Tartarian Honeysuckle (<i>Lonicera tatarica</i>) with Self-heal (<i>Prunella vulgaris</i> ssp. <i>lanceolata</i>), Red Baneberry (<i>Actaea rubra</i>), Common Buckthorn (<i>Rhamnus cathartica</i>), Wild Lily-of-the-valley (<i>Maianthemum canadense</i>), Violet species (<i>Viola</i> sp), Broad-leaved Enchanter's Nightshade (<i>Circaea canadensis</i>), and False Solomon's-seal (<i>Maianthemum racemosum</i>) associates.	Woodland "B"	1
3	FODM5	Dry-Fresh Sugar Maple Deciduous Forest Ecosite	Loam (A Horizon); Fine Sandy Loam (B Horizon)	1.20	Sugar Maple (<i>Acer saccharum</i>) was the dominant tree species present with Eastern Hop-hornbeam (<i>Ostrya virginiana</i>), White Ash (<i>Fraxinus americana</i>), Bitternut Hickory (<i>Carya cordiformis</i>), Large-tooth Aspen (<i>Populus grandidentata</i>), and American Basswood (<i>Tilia americana</i>) associates. Shrub cover consisted of Choke Cherry (<i>Prunus virginiana</i>), Prickly Gooseberry (<i>Ribes cynosbati</i>), and Tartarian Honeysuckle (<i>Lonicera tatarica</i>). Ground cover consisted of Bloodroot (<i>Sanguinaria canadensis</i>), Broad-leaved Enchanter's Nightshade (<i>Circaea canadensis</i>), Pennsylvania Sedge (<i>Carex pensylvanica</i>), Hairy Solomon's Seal (<i>Polygonatum pubescens</i>), Eastern Helleborine (<i>Epipactis helleborine</i>), Violet species (<i>Viola</i> sp), and Red Trillium (<i>Trillium erectum</i>).	Woodland "A"	2,3
4	MEFM1	Regenerating Dry-Fresh Forb Meadow Ecosite	Very fine Sandy Loam (A Horizon); Very fine Sand (B Horizon)	68.53	Silvery Cinquefoil (<i>Potentilla argentea</i>), Aster species (<i>Asteraceae</i> sp.) and Hawkweed species (<i>Hieracium</i> sp) were the dominant plant species with Sheep Sorrel (<i>Rumex acetosella</i>), Common St. John's-wort (<i>Hypericum perforatum</i>), Scentless Chamomile (<i>Tripleurospermum inodorum</i>), Black Medic (<i>Medicago lupulina</i>), Annual Fleabane (<i>Erigeron annuus</i>), Common Plantain (Plantago major), Hoary False-alyssum (<i>Berteroa incana</i>), Red Clover (<i>Trifolium pratense</i>), White Clover (<i>Trifolium repens</i>), and Tufted Vetch (<i>Vicia cracca</i>) associates.	Portions of this community were previously annual row crop succeeded by early successional forb meadow dominated by common weed species. Other areas are highly disturbed with on-going grading and stockpiling of soils. These areas contain roadways throughout traversed by the trucks and machinery used for extraction activities. There are very sparse meadow species and mostly consist of common weeds.	4, 5, 6
5	Cleared Land	---	---	---	---	Tilled land	7, 8
6	TAGM5	Fencerow	Loam (A Horizon); Fine Sandy Loam (B Horizon)	3.65	Tree species observed include White Ash (<i>Fraxinus americana</i>), Sugar Maple (<i>Acer saccharum</i>), American Elm (<i>Ulmus americana</i>), and Eastern Hop-hornbeam (<i>Ostrya virginiana</i>). Shrub cover includes Prickly Gooseberry (<i>Ribes cynosbati</i>), and Tartarian Honeysuckle (<i>Lonicera tatarica</i>).	Rock piles present	9
7	THMM1-1	Native Mixed Regeneration Thicket Type	Loam (A Horizon); Fine Sandy Loam (B Horizon)	0.13	Tree species observed include Eastern White Pine (<i>Pinus strobus</i>), Wild Black Cherry (<i>Prunus serotina</i>), and Bur Oak (<i>Quercus macrocarpa</i>). Shrub cover consisted of Staghorn Sumac (<i>Rhus hirta</i>), Choke Cherry (<i>Prunus virginiana</i>), Riverbank Grape (<i>Vitis riparia</i>), Serviceberry species (<i>Amelanchier</i> sp), Ground Juniper (<i>Juniperus communis</i>), Eastern Red Cedar (<i>Juniperus virginiana</i>), Common Blackberry (<i>Rubus allegheniensis</i>), Tartarian Honeysuckle (<i>Lonicera tatarica</i>), and Hawthorn species (<i>Crataegus</i> sp). Ground cover consisted of Black-eyed Susan (<i>Rudbeckia hirta</i> var. <i>pulcherrima</i>), Common Mullein (<i>Verbascum thapsus</i>), Common Timothy (<i>Phleum pratense</i>), Sheep Sorrel (<i>Rumex acetosella</i>), Wild Strawberry (<i>Fragaria virginiana</i>), Tufted Vetch (<i>Vicia cracca</i>), Silvery Cinquefoil (<i>Potentilla argentea</i>), Kentucky Bluegrass (<i>Poa pratensis</i> ssp. <i>pratensis</i>), and Red Clover (<i>Trifolium pratense</i>).		10

5.2.3	<p>Wetlands</p> <p>ELC field work confirmed that no wetlands are present within or adjacent to the Property.</p>
5.2.4	<p>Woodlands</p> <p>Two woodlands were identified in the Property (Woodland 'A' & 'B') (Figure 3). These woodlands were previously evaluated using provincial significance criteria outlined in the Natural Heritage Reference Manual (NHRM) (MNRF 2010) as part of the Barrhaven South Urban Expansion Study Area Community Design Plan's (CDP) Environmental Management Plan, initiated in consultation with the City in 2015, and completed in 2017.</p> <p>Based on the significance criteria outlined in the NHRM, neither Woodland A nor B were determined to be significant as they do not meet the size requirement, or any of the ecological function criteria (i.e., interior habitat, linkages, water protection, etc.).</p> <p>Since that time, the City has adopted new woodland significance criteria under Official Plan Amendment (OPA) 179 to the City's OP. In accordance with the City's Report to Planning Committee (dated December 13, 2016) and Council (dated January 25, 2017), these new policies only affect those development applications where there is not yet an agreement on the existing natural heritage system conditions as of the date of the adoption of OPA 179. The report goes on suggest that significant planning has occurred for most of the City's new urban expansion study areas, and the new policies are not intended to re-visit decisions already made through these planning processes with respect to identification of the natural heritage system. As a result, determinations made regarding significance of woodlands as part of the CDP have been reflected in this EIS; and, therefore, no significant woodlands are present within the Property.</p> <p>Potential impacts relating to vegetation removal have been included in Section 7.1.1.</p>
5.2.5	<p>Significant Wildlife Habitat</p> <p>The results of the field surveys, as they apply to significant wildlife habitat, are detailed below.</p>
5.2.5.1	<p>Bat Maternity Colonies</p> <p>No suitable cavity trees or evidence of bat maternity roosting was documented during ELC and Tree Inventory surveys.</p>
5.2.5.2	<p>Snake Hibernacula</p> <p>No snakes were observed during hibernacula identification or basking surveys.</p>

5.2.5.3

Breeding Bird Surveys

During breeding bird surveys a total of 21 bird species were observed during the breeding bird surveys in 2015. Of the 21 species observed, all are considered common within the Ottawa area. Most species observed are considered *Secure* (S-Rank of S5) or *Apparently Secure* in Ontario (S-Rank of S4) with the exception of Barn Swallow (*Threatened*) and Eastern Wood-pewee (*Special Concern*). All bird species identified during breeding bird surveys in 2015 are listed below in Table 8.

Two open country breeding bird species, Savannah Sparrow and Vesper Sparrow; (Table 8), were documented during the 2015 field investigations. The Property contains large areas of agricultural land that have begun succeeding into forb meadow consisting of bare soil patches and weeds. These meadows are just beginning to establish and therefore do not have a history of longevity. Furthermore they are regenerating with weedy forb species rather than grasslands. Based on the current species present, sparsity of vegetation, and lack of taller vegetation to perch on, these areas are unsuitable for open country bird species.

One area-sensitive breeding bird species, Yellow-bellied Sapsucker (Table 8) was documented during the 2015 field investigations; however the woodlands within the Property do not meet the size and interior habitat criteria for Woodland Area-Sensitive Breeding Bird Significant Wildlife Habitat in the Eco-Region 6E Criterion Schedules (MNRF, 2015). Therefore, habitats within the Property boundaries are not suitable to support significant wildlife habitat for woodland area-sensitive bird species.

A fly-over of a Northern Rough-winged Swallow was documented during the field investigation (Table 8). This species is a Colonial Nesting Bird, identified in the Colonially-Nesting Bird Breeding Habitat (Bank and Cliff) of the Eco-region criterion schedule. Breeding habitat for Colonially-Nesting species includes eroding banks, sandy hills, borrow pits, steep slopes and sand piles. Such habitat communities are not present within the Property; However, as species may be nesting within the vicinity of the Property (i.e., within the nearby aggregate extraction lands), mitigation measures should be established into order to avoid Colonially-Nesting Bird species within the Property during construction phases.

Eastern Wood-pewee was observed singing during breeding bird surveys within Woodland A and B (Figure 4). Preferred habitat for Eastern Wood-pewee includes open, deciduous, mixed, or coniferous forest predominated by oak (MNRF, 2000). The species is most abundant in intermediate-age mature forest stands with little understory vegetation (MNRF, 2017). Neither Woodland A nor B contained oak trees, and showed quite dense understory vegetation (refer to Photos 1-3 in *Appendix E*). Although this species was identified through breeding bird surveys, it is more likely that it is utilizing nearby woodlands of greater size and diversity with more mature trees (e.g., Cambian Woods) that may provide more suitable habitat. Therefore, significant wildlife habitat for this species is not present within the Property.

Potential impacts to general wildlife and wildlife habitat have been included in Section 7.1.4.

TABLE 8: BREEDING BIRD SURVEY RESULTS

Scientific Name	Common Name	Breeding Status	Abundance On Property	Provincial Status	Observed/ Heard	Comments
<i>Carduelis tristis</i>	American Goldfinch	Possible	Common	S5B	Heard, Observed	Flyover
<i>Cathartes aura</i>	Turkey Vulture	Observed	Rare	S5	Observed	Flyover
<i>Colaptes auratus</i>	Northern Flicker	Possible	Sparse	S5B,S5N	Heard	Calls
<i>Contopus virens</i>	Eastern Wood-pewee	Possible	Sparse	S4B	Observed	
<i>Corvus brachyrhynchos</i>	American Crow	Possible	Sparse	S4B	Heard, Observed	Flyover
<i>Cyanocitta cristata</i>	Blue Jay	Confirmed	Sparse	S4B	Heard	Calls, fledged/downy young
<i>Dumetella carolinensis</i>	Gray Catbird	Possible	Rare	S5B	Heard	
<i>Hirundo rustica</i>	Barn Swallow	Observed	Rare	S5	Observed	Foraging
<i>Larus delawarensis</i>	Ring-billed Gull	Observed	Rare	S4B	Observed	Flyover
<i>Melospiza melodia</i>	Song Sparrow	Probable	Common	S4B	Heard	Calls, fledged/downy young
<i>Passerculus sandwichensis</i>	Savannah Sparrow	Possible	Common	S5	Heard	
<i>Picoides pubescens</i>	Downy Woodpecker	Possible	Sparse	S4B	Heard, Observed	
<i>Poecile atricapillus</i>	Black-capped Chickadee	Possible	Common	S4B	Heard	
<i>Pooecetes gramineus</i>	Vesper Sparrow	Possible	Sparse	S5	Heard, Observed	
<i>Sphyrapicus varius</i>	Yellow-bellied Sapsucker	Possible	Rare	S4B	Heard	
<i>Spizella passerina</i>	Chipping Sparrow	Possible	Rare	S5B	Heard	
<i>Stelgidopteryx</i>	Northern Rough-winged Swallow	Observed	Sparse	S5B	Observed	Flyover

Scientific Name	Common Name	Breeding Status	Abundance On Property	Provincial Status	Observed/ Heard	Comments
<i>serripennis</i>						
<i>Troglodytes aedon</i>	House Wren	Possible	Rare	S5B	Heard	
<i>Turdus migratorius</i>	American Robin	Confirmed	Common	S4B	Heard	Calls, fledged/downy young
<i>Tyrannus tyrannus</i>	Eastern Kingbird	Possible	Rare	S5B	Heard	
<i>Zenaida macroura</i>	Mourning Dove	Possible	Sparse	S5B	Observed	

1 = Denote if species is identified in a specific Significant Wildlife Habitat category; outlined in the "Significant Wildlife Habitat Criteria Schedules for Eco-Region 6E" (MNRF, 2015)

5.2.6 Species at Risk

5.2.6.1 Barn Swallow

One Barn Swallow was observed as a flyover near an outbuilding in the south of the Property during field surveys in 2015. Although there was no evidence to support the presence of SAR habitat within the Property (i.e., no evidence of Barn Swallow nesting in outbuildings), larger buildings within the residential property may provide nesting habitat for this species and will be considered candidate nesting habitat for the purposes of this study. Figure 4 illustrates the location of potential Category 3 habitat for this species.

Next steps related to Barn Swallow have been included in Section 7.1.5.

5.2.6.2 Bank Swallow

On May 25, 2016, members of the project team from the City and MNRF participated in a site walk of the Property, which included the mineral extraction lands to the north, which are not a part of the current development proposal. During this time, an active Bank Swallow colony was observed within the active portion of the extraction area northwest of the Property. This incidental observation has been included in Section 5.4.

Although these lands are not part of the current proposed development Property, mitigation measures related to Bank Swallow and other colonially nesting bird species have been recommended and included in Section 8.3.

5.2.6.3 Butternut

During field surveys no Butternut trees were documented within or adjacent to the Property.

5.2.6.4 Bats

A search for suitable bat habitat and roosting sites was completed in tandem with ELC surveys and tree inventory within the Property. No cavity trees or evidence of bat maternity roosting was documented. No SAR bats or candidate bat habitat were identified during field surveys.

Although no SAR bats or bat habitat were specifically observed, mitigation measures related to bats have been included in Section 8.3.

5.3 Tree Inventory

A Tree Inventory was conducted in conjunction with ELC survey to evaluate potential impacts to trees and to identify trees suitable for incorporation into development planning.

Trees observed within portions of the woodlands and fencerow showed generous species and size diversity, which are characteristics favorable for retention and integration into the future community. These characteristics generally favour longer-lived species like maple, hickory, and oak, and these are trees that can be potentially retained and grow into the developing community. Table 9 summarizes forest stand characteristics within the Property.

TABLE 9: FOREST BASAL AREA

Woodland ID	ELC Code	Forest Stand Area (Ha)	Basal Area Per Hectare (M ² /Ha)	Stand Basal Area (M ²)	Average Tree Health
A	FODM5	1.97	24	47.28	Good
B	FODM4-2	1.89	12	22.68	Good

All trees identified are considered common to the Ottawa area and none were considered at risk. Table 10 below outlines the tree species that were identified within the Property.

TABLE 10: TREE SPECIES WITHIN THE PROPERTY

Scientific Name	Common Name
<i>Acer negundo</i>	Manitoba Maple
<i>Acer saccharum</i>	Sugar Maple
<i>Carya cordiformis</i>	Bitternut Hickory
<i>Fraxinus americana</i>	White Ash
<i>Juniperus virginiana</i>	Eastern Red Cedar
<i>Ostrya virginiana</i>	Eastern Hop-hornbeam
<i>Pinus strobus</i>	Eastern White Pine
<i>Populus balsamifera</i>	Balsam Poplar
<i>Populus grandidentata</i>	Large-tooth Aspen
<i>Prunus serotina</i>	Wild Black Cherry
<i>Quercus macrocarpa</i>	Bur Oak
<i>Tilia americana</i>	American Basswood
<i>Ulmus americana</i>	American Elm

Two Specimen Trees were identified within the Property (Table 11). The location of each Specimen Tree within the Property is shown on Figure 4.

TABLE 11: SPECIMEN TREES OBSERVED WITHIN THE PROPERTY

Scientific Name	Common Name	DBH	Condition
<i>Tilia americana</i>	American Basswood	96.1	Good
<i>Tilia americana</i>	American Basswood	82	Good

While the majority of the trees identified are common to the Ottawa area, portions of Woodlands A and B are considered to have a higher overall quality relative to the rest of that entire woodland area. A site walk was conducted with staff from Dillon and the City present on October 31, 2017 to define these areas of “High Quality Forest Community” (Figure 4). These areas also contain the most valuable trees in the Property and the best opportunities for retention.

Opportunities for tree and woodland retention as well as potential impacts related to woodland removal within the Property have been included in Section 7.1.1 and 8.1.

5.4

Incidental Wildlife

Incidental wildlife species observed adjacent to and within the property are listed in Table 12 below. All species observed are common in the Ottawa area and have an S-Rank of S4 or S5.

TABLE 12: INCIDENTAL WILDLIFE SPECIES OBSERVED WITHIN AND ADJACENT TO THE PROPERTY

Scientific Name	Common Name	Resident/Visitor	Evidence
BIRDS			
<i>Agelaius phoeniceus</i>	Red-winged Blackbird	Resident	Vocalization
<i>Anas platyrhynchos</i>	Mallard	Visitor	Visual observation
<i>Ardea herodias</i>	Great Blue Heron	Visitor	Visual observation
<i>Bombycilla cedrorum</i>	Cedar Waxwing	Resident	Vocalization
<i>Buteo jamaicensis</i>	Red-tailed Hawk	Visitor	Vocalization
<i>Charadrius vociferus</i>	Killdeer	Visitor	Vocalization
<i>Meleagris gallopavo</i>	Wild Turkey	Resident	Tracks, Visual observation
<i>Myiarchus crinitus</i>	Great Crested Flycatcher	Visitor	Vocalization
<i>Passerina cyanea</i>	Indigo Bunting	Visitor	Vocalization
<i>Picoides villosus</i>	Hairy Woodpecker	Visitor	Vocalization
<i>Troglodytes troglodytes</i>	Winter Wren	Visitor	Visual observation
<i>Vireo olivaceus</i>	Red-eyed Vireo	Resident	Vocalization
<i>Riparia riparia</i>	Bank Swallow	Resident	Visual observation

Scientific Name	Common Name	Resident/Visitor	Evidence
MAMMALS			
<i>Odocoileus virginianus</i>	White-tailed Deer	Resident	Tracks
<i>Tamias striatus</i>	Eastern Chipmunk	Resident	Visual observation
HERPTILES			
<i>Lithobates clamitans</i>	Green Frog	Resident	Vocalization

Potential impacts to wildlife within the Property have been included in Section 7.1.4.

6.0

Description of Proposed Development

The proposed residential development consists of development of a new residential subdivision. The proposed development will include construction of the following:

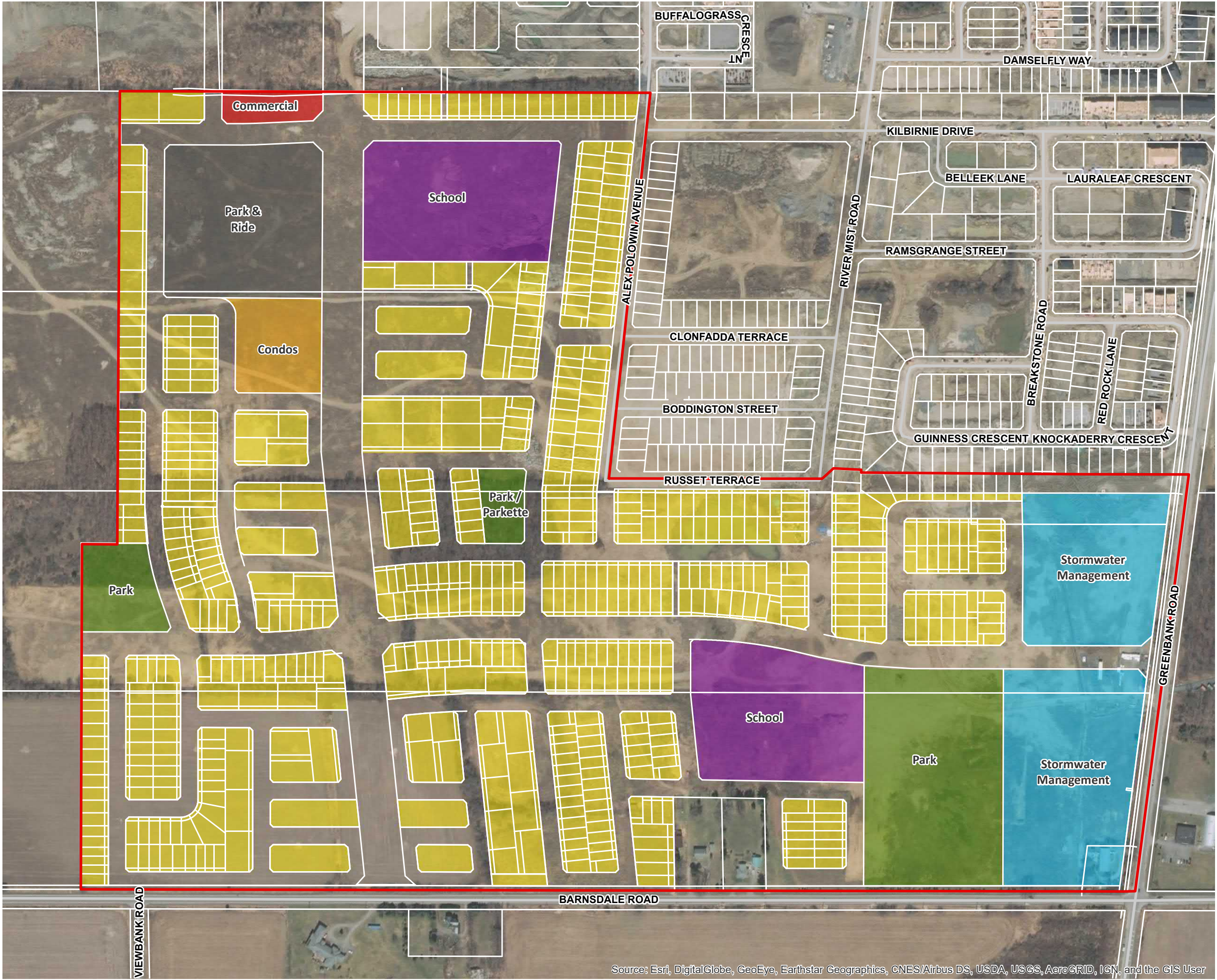
- Educational buildings;
- Park and/or parkettes;
- Stormwater management facilities;
- Low density residential buildings;
- Medium density residential buildings; and
- City transit "Park and Ride".

Refer to Figure 5 for the proposed development.

For the purposes of this EIS, we are assuming the proposed removal of all vegetation and woodlands, with exception of the areas identified as "Park" on Figure 5. It should be noted that the Area Park Plan is concept only at this stage. Tree and vegetation removal may occur within these areas, to be determined at the Detailed Design stage.

Construction of the proposed development would also include the construction of buildings, placement of hardscape (parking areas, sidewalks) and underground servicing for SWM and sanitary water. Landscaping may include, but is not limited to, the installation of sod, and tree plantings. Access to the Property will utilize an entrance on Greenbank Road.

The potential impacts of the proposed development and the recommended mitigation measures are discussed in Sections 7 and 8.



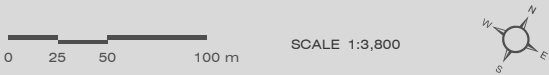
QUINN'S POINTE STAGE 2

ENVIRONMENTAL IMPACT STATEMENT

PROPOSED DEVELOPMENT

FIGURE 5

- Study Area
- Proposed Site Plan
- Road
- Education
- Commercial
- Residential
- Condos
- Park & Ride
- Park / Parkette
- Stormwater Management



MAP DRAWING INFORMATION:
DATA PROVIDED BY MNR

MAP CREATED BY: LK
MAP CHECKED BY: WM
MAP PROJECTION: NAD 1983 UTM Zone 18N



PROJECT: 15-1769
STATUS: DRAFT
DATE: 2018-03-05

7.0

Impact Assessment and Mitigation

7.1

Direct Impacts

Direct impacts are those that are immediately evident as a result of a development. Typically, the adverse effects of direct impacts are most evident during the site preparation and construction phase of a development. Potential direct impacts of the proposed residential development include the following:

- Tree and vegetation removal;
- Erosion and sedimentation into natural features (adjacent woodland area);
- Loss of and/or alteration of significant groundwater recharge area;
- Loss of and/or disturbance to general wildlife and wildlife habitat; and,
- Potential impacts to SAR and SAR habitat.

The proposed site plan and environmental impacts of development are shown in Figure 6.

7.1.1

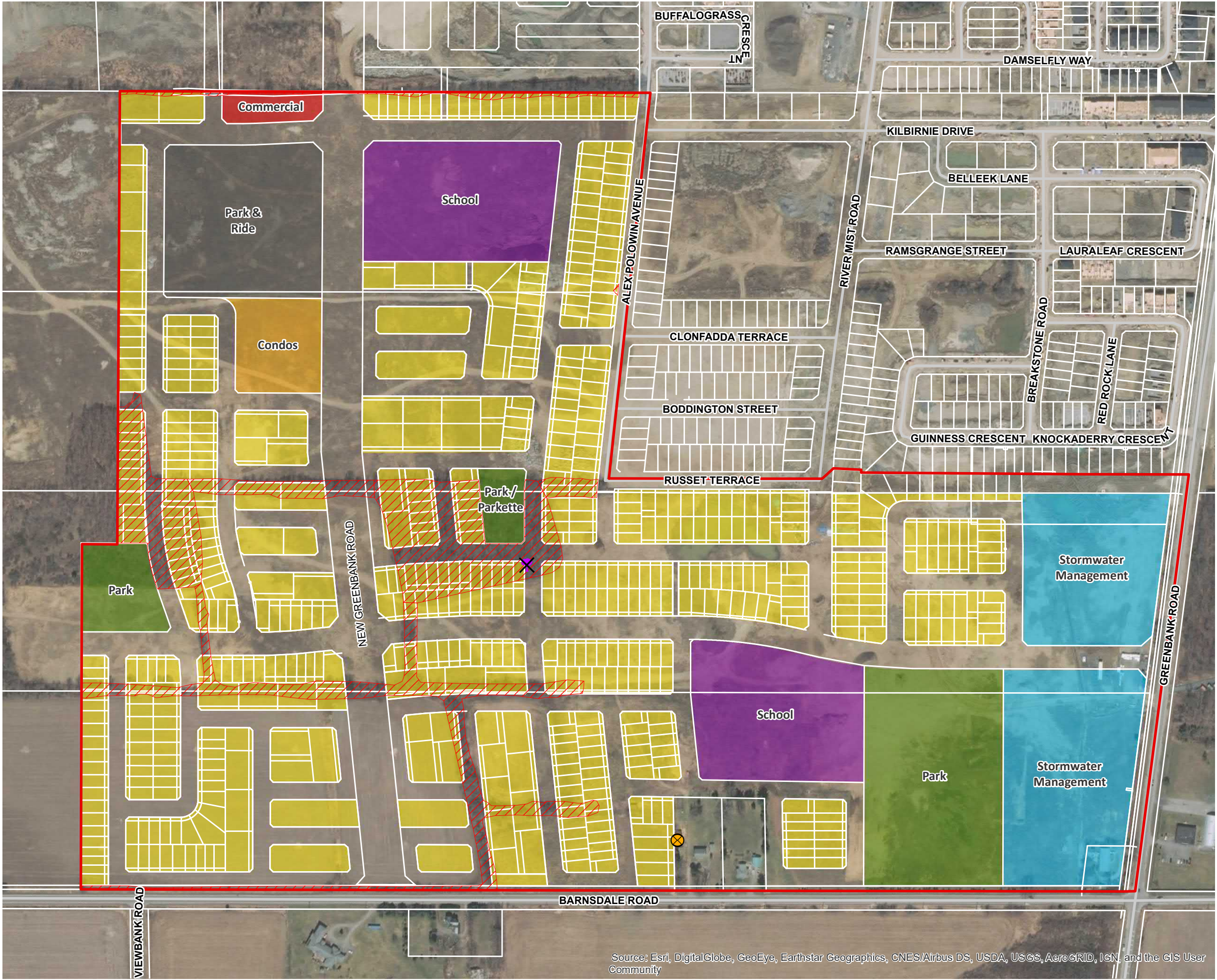
Tree and Vegetation Removal

The proposed development plan indicates tree and ground vegetation removal is limited to the development area as shown on Figure 6 to facilitate grading and construction.

As mentioned in Section 6.0, for the purposes of this EIS, we have assumed the proposed removal of all vegetation and woodlands, with exception of the areas identified as “Park” on Figure 5. As a result, the proposed development will require the removal of approximately 4.7 ha of vegetation communities (including woodland and fencerows) within the development area.

Tree removal will result in a reduction of tree cover, marginal wildlife habitat loss including significant wildlife habitat for Eastern Wood-pewee, and alteration of soil conditions. On a site level, the impacts of tree and vegetation removal may include:

- Direct loss of trees;
- Decreased floral species richness and abundance;
- Negative edge effects, including altered soil conditions and water availability;
- Alteration of microclimate;
- Loss of native seed banks; and
- Physical injury, root damage, and compaction of trees not intended for removal as a result of construction operations.



FILE LOCATION: \\dillon.ca\DILLON_DFS\Ottawa\Ottawa CAD\CAD\2017\17XXXX - Quinn's Pointe (Barrhaven South) EIS\MXD\Fig5_Impacts_11x17.mxd

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



QUINN'S POINTE STAGE 2

ENVIRONMENTAL IMPACT STATEMENT

POTENTIAL IMPACTS

FIGURE 6

- Study Area
- Road
- Candidate Barn Swallow Nest Site to be Removed
- Specimen Tree to be Removed
- Vegetation Removal
- Proposed Site Plan
- Education
- Commercial
- Residential
- Condos
- Park & Ride
- Park / Parkette*
- Stormwater Management

* The Area Park Plan is concept only. Tree and vegetation removal may occur within park areas, to be determined through Detailed Design.

0 25 50 100 m SCALE 1:3,800



MAP DRAWING INFORMATION:
DATA PROVIDED BY MNR

MAP CREATED BY: LK
MAP CHECKED BY: WM
MAP PROJECTION: NAD 1983 UTM Zone 18N



PROJECT: 15-1769
STATUS: DRAFT
DATE: 2018-02-05

With the exception of the two small non- significant woodlands, the Property consists of disturbed agricultural lands which provide minimal ecological function. As a result, removal of portions of woodland will result in minimal habitat loss, minimal reduction of natural cover in the area; due to the small size and surrounding disturbed areas.

As the total woodland and individual tree removal has not yet been determined, an updated Tree Inventory will be required prior to development to confirm the locations and number of trees to be removed as per the finalized site plan, established through Detailed Design. The final plan will take into account areas identified as “high quality” habitat within the woodlands for retention where possible.

7.1.2 Loss of and/or Alteration of Significant Groundwater Recharge Area

Due to the sandy soils, surface water is minimal within the Property; however, as mentioned, the Property lies within the Kars Esker which functions as an important groundwater recharge area and is recognized in the *Mississippi-Rideau Source Protection Plan* as a highly vulnerable aquifer (City of Ottawa, 2016) and a Significant Groundwater Recharge Area under the Ontario Clean Water Act (2006). The potential impacts of changes to land use and land cover can include changes to groundwater infiltration, run off, stream flow regime, water quality, downstream channel erosion, and wildlife habitat. More specifically, changes may include:

- Modification of infiltration flow into the Kars Esker feature; and
- Alteration of groundwater discharge rates from infiltration sourced within the Property (Kars Esker) into downstream receivers.

Mitigation measures related to surface water are discussed in Section 8.2.

7.1.3 Erosion and Sedimentation of Natural Features

Due to the potential reduction in infiltration rates post-development, there is the potential for adjacent woodlands and thicket communities to be impacted as a result of development if construction best management practices are not implemented. Potential impacts to these features may include, but are not limited to, disturbance to or loss of additional vegetation due to the deposition of dust and/or overland mobilization of soil.

Refer to Section 8.4 for mitigation measures related to erosion and sedimentation within the Property.

7.1.4 Loss of and/ or Disturbance to General Wildlife and Wildlife Habitat

Since development activities are proposed within Woodland A & B, the potential for impacts to wildlife species utilizing the woodland is possible. In addition, there is potential for other flora

and fauna to be impacted by vegetation clearing and other activities within the greater development area. Wildlife habitat may be impacted by construction in the following ways:

- Displacement, injury, or death resulting from contact with heavy equipment during clearing and grading activities;
- Disturbance to wildlife as a result of noise associated with construction activities, particularly during breeding periods; and
- Loss of general wildlife habitat.

Mitigation measures related to wildlife have been included in Section 8.3.

7.1.5

Species at Risk

One Barn Swallow was observed (fly-over) within the Property. Habitat for this species is limited to the single family residential home and associated outbuildings along Barnsdale Road. Since there is potential for Barn Swallow to be nesting within structures located within the Property, it is recommended that structures proposed for removal (i.e., barns, sheds, etc.) are assessed for presence of Barn Swallow nests prior to construction activities. In the event Barn Swallow nest(s) are observed and their removal is required in support of the development, the removal of the nest(s) can be registered through the MNRF registry process. Timing windows do, however, apply with respect to when a Barn Swallow nest can be removed and, subsequently when compensation habitat is required to be in place.

7.2

Indirect Impacts

Indirect impacts are those that do not always manifest in the core development area, but in the lands adjacent to the development. Indirect impacts can begin in the construction phase; however, they can continue post-construction. Potential indirect impacts of the proposed development include anthropogenic disturbance and colonization of non-native and/or invasive species.

7.2.1

Anthropogenic disturbance

Disturbance to local wildlife communities due to direct and indirect impacts on the lands adjacent to the proposed development could result if left unmitigated. Direct effects may include conflict between wildlife and humans or domestic pets following development, including predation, mortality from vehicles, and poisoning. Indirect effects may include noise, light, vibration and human presence that can adversely influence the population size and breeding success of local wildlife.

These effects are more pronounced when new development is introduced in non-urban areas. Lands within the development area are already disturbed with adjacent land uses. Therefore, the proposed development is not anticipated to cause a negative impact to surrounding natural areas.

7.2.2

Colonization of Non-native and/or Invasive Species

Physical site disturbance may increase the likelihood that non-native and/or invasive flora species will be introduced to the surrounding vegetation communities. Invasive flora can establish in disturbed sites and can encroach onto adjacent undisturbed lands more efficiently than native flora. This type of colonization is currently occurring within the Property particularly in the regenerating areas. In order to maximize ecological function within the planting of native tree and shrub species is recommended.

8.0

Mitigation and Opportunities for Enhancement

Mitigation involves the avoidance or minimization of developmental impacts through good design, construction practices and/or restoration and enhancement activities. The feasibility of mitigation options has been evaluated based on the natural features within and adjacent to the Property. The impact assessment highlighted five potential direct impacts, which include tree and vegetation removal, loss of and/or alteration to significant groundwater recharge area, erosion and sedimentation of natural features, potential impacts to SAR and SAR habitat, and loss of and/or disturbance to general wildlife and wildlife habitat.

A variety of mitigation techniques can be used to minimize or eliminate the above-mentioned impacts. These measures include enhancement of the buffer area through a Landscaping and Planting Plan, a Stormwater Management Plan, Erosion and Sediment Control Plan and an Environmental Monitoring Plan. Each mitigation measure is introduced below. Detailed mitigation measures will be finalized in consultation with the City as part of the preliminary and Detailed Design of the development.

8.1

Landscaping and Planting Plan

The proposed development plan will require the removal of woodlands, trees, shrubs, wildflowers etc., limited to the Property as indicated on Figure 4.

As a result, a Landscaping and Planting Plan should be prepared to off-set proposed vegetation removal and propose enhancements to natural areas where possible. Compensation plantings of trees are generally based on the number of removals required to facilitate construction of the development. The exact number of compensation plantings and locations is to be determined through Detailed Design. The preliminary proposed plantings include:

- A mix of native deciduous and coniferous trees and shrubs throughout the development and buffer area;
- Sodding within the residential portions of the development; and
- A native seed mix recommended by suppliers for enhancement of park areas and adjacent to natural features.

The following monitoring and maintenance measures may also be recommended for landscaped areas:

- Removal of invasive tree and shrubs (i.e., buckthorn), where applicable;

- Watering and weeding of newly planted areas as required for proper establishment of plantings; and
- Replacement of dead material from previous year's planting.

8.2 Integrated Stormwater Management Plan and Low Impact Design

A water quality storm distribution that considers the first 25 mm of rain that falls under a 24-hour period over the directly connected impervious area is proposed to be managed by a stormwater management (SWM) facility, to mitigate the petroleum pollution from parking lots and higher temperature of the runoff into downstream receivers.

Due to the sandy soils and high infiltration rates into the Kars Esker, Low Impact Development (LID) techniques are recommended in combination with standard SWM measures, where possible. Some LID options may include, but are not limited to, use of the following:

- Rain barrels to capture roof drainage and use for nearby irrigation and recharge;
- Green roof technology;
- Bio-infiltration measures such as rain gardens or bioswales;
- Use of permeable pavement applications;
- Vegetated filter strips; and
- Perforated pipe stormwater systems.

As part of the SWM plan, an Etobicoke Exfiltration System (perforated pipe system) is proposed as part of the Stormwater Treatment Measure sewer design. Modeling has demonstrated that pre-development infiltration rates will be maintained post-development through implementation of this system. More detailed methods for proposed Low Impact Development techniques and the proposed SWM infrastructure can be found in the servicing report prepared by J.L. Richards (2017).

8.3 Wildlife Impact Mitigation Plan

The best practices outlined in the *Protocol for Wildlife Protection during Construction* (City of Ottawa, 2015) should be followed during all construction activities associated with the development. The following measures are consistent with the protocol:

- Minimize impacts to breeding birds by clearing naturalized vegetation outside of the breeding bird season (April 1 – August 31). Should any clearing be required during the breeding bird season, nest searches conducted by a qualified person must be completed 48 hours prior to clearing activities. If nests are found, work within 10 m of the tree should cease until the nest has fledged. If no nests are present, clearing may occur. This is in accordance with the federal *Migratory Birds Convention Act*;
- Tree removal within woodlands should be conducted outside of the bat active season (April- October) to avoid impacts to bats utilizing the woodlands;

- Pre-stress the area on a regular basis leading up to construction to encourage wildlife to leave the area before construction starts. Other recommendations for pre-stressing are outlined in the *Protocol for Wildlife Protection during Construction* (City of Ottawa 2015);
- Orange snow fencing should be installed around the perimeter of the work area to clearly demarcate the development area and prevent wildlife from entering the construction zone. Fencing should be monitored regularly to ensure they are functioning properly and if issues are identified should be dealt with promptly;
- Ensure perimeter fencing does not prevent wildlife from leaving the site during clearing activities by clearing the area prior to installing the fence;
- Wildlife located within the construction area will be re-located to an area outside of the development into an area of appropriate habitat, as necessary;
- Construction crews working on site should be educated on local wildlife and take appropriate measures for avoiding wildlife; and
- Should an animal be injured or found injured during construction they should be transported to an appropriate wildlife rehabilitation center for care with a small donation of money to help pay for the care (a local facility is the Rideau Valley Wildlife Sanctuary).

In addition, the following site specific mitigation measures should be incorporated into the wildlife mitigation plan:

- Installation of wildlife exclusion fencing and escape routes, which direct wildlife away from the construction area and to more suitable habitat;
- Visual monitoring for wildlife species and avoidance where encountered, if possible;
- If necessary, have a qualified biologist monitor construction in the areas of potential wildlife habitat. If wildlife are found within the construction area they will be re-located to an area outside of the development into an area of appropriate habitat, as necessary;
- Stockpiling material within the Property should be avoided to mitigate potential SAR nesting (Bank Swallow ; and
- Should stockpiling be a necessity, material should be covered with a tarp or other impenetrable material if stockpile is to be left undisturbed for >2 hrs (including overnight).

8.4

Erosion and Sediment Control Plan

Construction activity, especially operations involving the handling of earthen material, dramatically increases the availability of sediment for erosion and transport by surface drainage. In order to mitigate the adverse environmental impacts caused by the release of sediment-laden runoff into receiving watercourses, measures for erosion and sediment control

are required for construction sites. This is an extremely important component of land development and plays an important role in the protection of downstream watercourses and aquatic habitat.

Control measures must be selected that are appropriate for the erosion potential of the site. It is important that the control measures be implemented and modified on a staged basis to reflect the site activities. Furthermore, their effectiveness decreases with sediment loading and therefore, inspection and maintenance is required.

In addition, an Erosion and Sediment Control Plan will be developed as part of detailed design for the proposed development. The plan may include, but is not limited to installation of geotextile silt fences, rock check dams, ditch checks, mud mats, temporary sediment ponds, designated topsoil stockpile areas, and cut-off swales and ditches to divert surface flows to the appropriate sediment control area; with provisions for re-vegetating the area as soon as construction is completed. More specifically, the plan may include the following measures:

- Standard duty silt fencing (OPSD 219.110) and/or other equivalent erosion and sediment controls should be installed around the perimeter of the work area to clearly demarcate the development area and prevent erosion and sedimentation into adjacent habitats. Erosion and sediment control measures should be monitored regularly to ensure they are functioning properly and if issues are identified should be dealt with promptly;
- Stockpiling of excavated material should not occur outside the delineated work area. If stockpiling is to occur outside of this area, silt fencing should be used to contain any spoil piles to prevent sedimentation into adjacent areas. Further, stockpiling of excavated materials will not occur within 30 m of watercourses;
- A spill response plan should be developed and implemented as required; and
- The use of silt socks, dewatering ponds, etc. should be implemented to avoid sedimentation and erosion in adjacent areas as required. If dewatering requires more than 50,000 litres (L) of water to be pumped per day, appropriate permits must be obtained from the Ministry of Environment and Climate Change prior to the dewatering.

8.5 Environmental Monitoring Plan

The Environmental Monitoring Plan (EMP) will be carried out through the duration of construction activities on-site to ensure that the erosion and sediment control measures operate effectively and to monitor the potential impact, if any, upon the natural environment. The duration of construction is defined as the period of time from the beginning of earthworks until the site is stabilized. Site stabilization is defined as the point in time when the roads have been paved, buildings have been built, lawns have been sodded and restoration plantings have been completed.

Erosion and sediment control measures should be regularly monitored and are likely to require periodic cleaning (e.g. removal of accumulated silt), maintenance and/or re-construction. Inspections of the erosion and sediment controls on the construction site should be undertaken by a certified sediment and erosion control monitor. If damaged control measures are observed they should be repaired and/or replaced promptly.

The EMP will be implemented during active construction periods in the development area with the following frequency:

- On a bi-weekly basis; and/or
- After every 10 mm or greater rainfall event.

Protected vegetation areas will require periodic monitoring to ensure that they are not being impacted by the proposed development. Should impacts be observed, necessary steps will be taken to ensure that the impacted vegetation is either restored or replaced.

9.0

Summary and Conclusions

This EIS was prepared for the proposed development of Quinn's Pointe Phase 2, located in the City of Ottawa. The findings of the biophysical inventory, which consisted of secondary source reviews and comprehensive field studies, are presented in this EIS. Due to the presence of natural heritage features designated by the Province and the City of Ottawa, this EIS report has been prepared.

The majority of the Study Area consists of cleared lands or regenerating forb meadow, with two small non-significant woodlands that provide general wildlife habitat for common plant and wildlife species. While most plant and wildlife species observed within the Property are considered common and secure in Ontario, two SAR were observed during field surveys in 2015; Barn Swallow and Bank Swallow, although the Bank Swallow sighting was outside of the current proposed development area.

The proposed development will require the removal of trees and vegetation from within the Property. As a result, potential impacts of development may include loss of woodland cover, loss of general wildlife habitat, loss of local native vegetation, and loss of infiltration flows into the Kars Esker which functions as an important groundwater recharge area.

These impacts will be avoided or minimized by implementing the mitigation, restoration, and management measures described in this report. As such, Landscaping and Planting Plan, and Erosion and Sediment Control Plan are recommended to minimize impacts as a result of the proposed development; and an Environmental Monitoring Plan is recommended during construction to monitor impacts on the natural environment and ensure mitigation measures are implemented.

In addition, should removal of structures containing potential Barn Swallow nests be required, a nest search should be conducted prior to removal and if required, appropriate steps followed to register the activity with the MNRF.

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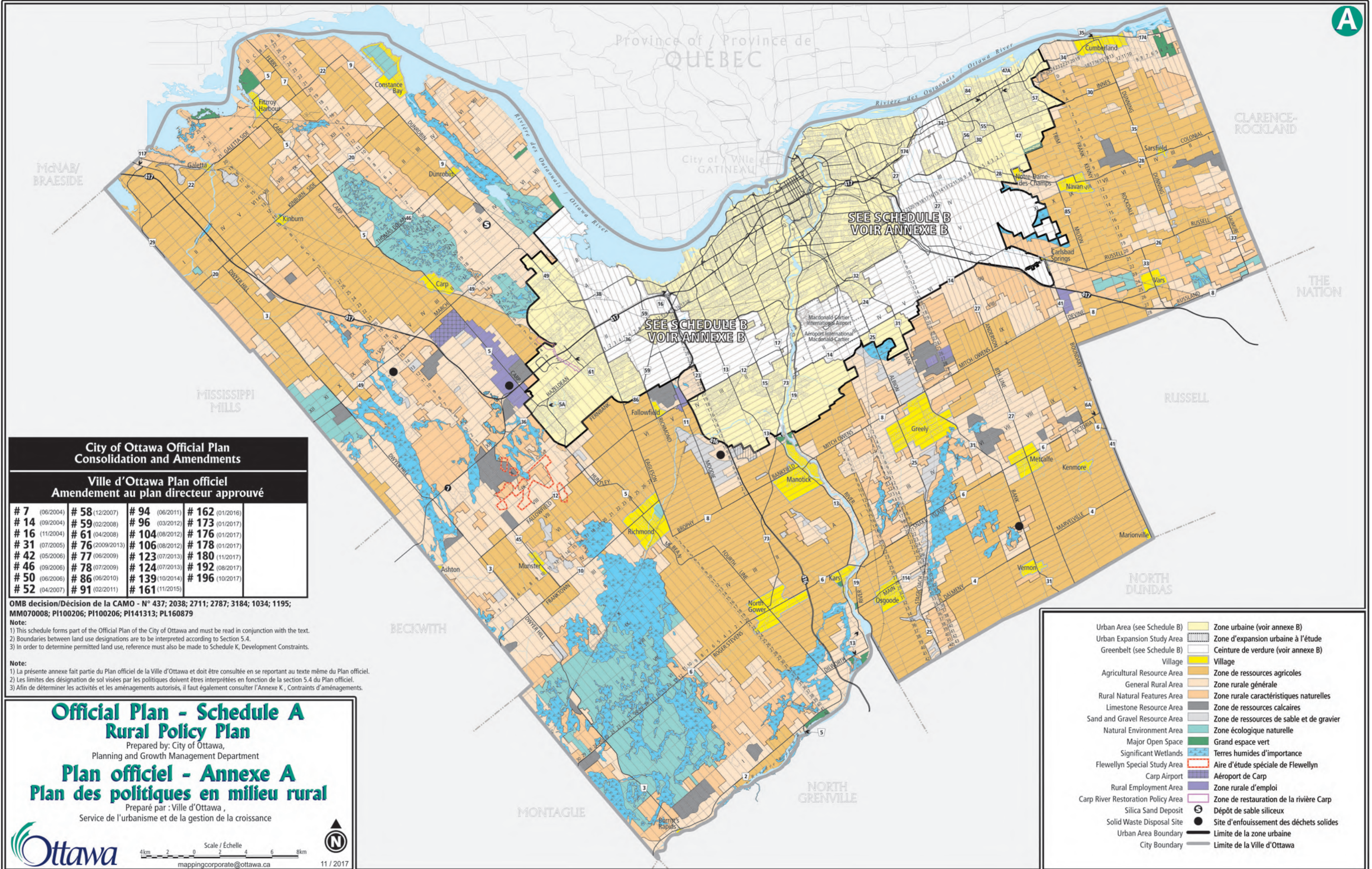
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Appendix A

Official Plan Schedule A



City of Ottawa Official Plan
Consolidation and Amendments

Ville d'Ottawa Plan officiel
Amendement au plan directeur approuvé

# 7 (06/2004)	# 58 (12/2007)	# 94 (06/2011)	# 162 (01/2016)
# 14 (09/2004)	# 59 (02/2008)	# 96 (03/2012)	# 173 (01/2017)
# 16 (11/2004)	# 61 (04/2008)	# 104 (08/2012)	# 176 (01/2017)
# 31 (07/2005)	# 76 (2009/2013)	# 106 (08/2012)	# 178 (01/2017)
# 42 (05/2006)	# 77 (06/2009)	# 123 (07/2013)	# 180 (11/2017)
# 46 (09/2006)	# 78 (07/2009)	# 124 (07/2013)	# 192 (08/2017)
# 50 (06/2006)	# 86 (06/2010)	# 139 (10/2014)	# 196 (10/2017)
# 52 (04/2007)	# 91 (02/2011)	# 161 (11/2015)	

OMB decision/Décision de la CAMO - N° 437; 2038; 2711; 2787; 3184; 1034; 1195;
MM070008; PI100206; PI100206; PI141313; PL160879

Note:
1) This schedule forms part of the Official Plan of the City of Ottawa and must be read in conjunction with the text.
2) Boundaries between land use designations are to be interpreted according to Section 5.4.
3) In order to determine permitted land use, reference must also be made to Schedule K, Development Constraints.

Note:
1) La présente annexe fait partie du Plan officiel de la Ville d'Ottawa et doit être consultée en se reportant au texte même du Plan officiel.
2) Les limites des désignation de sol visées par les politiques doivent être interprétées en fonction de la section 5.4 du Plan officiel.
3) Afin de déterminer les activités et les aménagements autorisés, il faut également consulter l'Annexe K, Contraintes d'aménagements.

Official Plan - Schedule A
Rural Policy Plan

Prepared by: City of Ottawa,
Planning and Growth Management Department

Plan officiel - Annexe A
Plan des politiques en milieu rural

Préparé par : Ville d'Ottawa,
Service de l'urbanisme et de la gestion de la croissance



Scale / Échelle
4km 2 0 2 4 6 8km
mappingcorporate@ottawa.ca



- Urban Area (see Schedule B) Zone urbaine (voir annexe B)
- Urban Expansion Study Area Zone d'expansion urbaine à l'étude
- Greenbelt (see Schedule B) Ceinture de verdure (voir annexe B)
- Village Village
- Agricultural Resource Area Zone de ressources agricoles
- General Rural Area Zone rurale générale
- Rural Natural Features Area Zone rurale caractéristiques naturelles
- Limestone Resource Area Zone de ressources calcaires
- Sand and Gravel Resource Area Zone de ressources de sable et de gravier
- Natural Environment Area Zone écologique naturelle
- Major Open Space Grand espace vert
- Significant Wetlands Terres humides d'importance
- Flewellyn Special Study Area Aire d'étude spéciale de Flewellyn
- Carp Airport Aéroport de Carp
- Rural Employment Area Zone rurale d'emploi
- Carp River Restoration Policy Area Zone de restauration de la rivière Carp
- Silica Sand Deposit Dépôt de sable siliceux
- Solid Waste Disposal Site Site d'enfouissement des déchets solides
- Urban Area Boundary Limite de la zone urbaine
- City Boundary Limite de la Ville d'Ottawa

Appendix B

MNRF Information Request

**Ministry of Natural Resources**

Kemptville District
P.O. Box 2002
10 Campus Drive
Kemptville, ON K0G 1J0

Tel.: (613) 258-8204
Fax.: (613) 258-3920

Ministère des Richesses naturelles

District de Kemptville
CP 2002
10 Campus Drive
Kemptville, ON K0G 1J0

Tél.: (613) 258-8204
Télééc.: (613) 258-3920

Thu. Jul 16, 2015

Alex Zeller
Dillon Consulting
177 Colonnade Rd, Suite 101
Ottawa
K2E 7J4
(613) 745-6338 ext 3011
azeller@dillon.ca

Attention: Alex Zeller

Subject: Information Request - Developments
Project Name: Barhaven South Expansion Area
Site Address: Cedarview Rd and Barnsdale Rd
Our File No. 2015_NEP-3112

Natural Heritage Values

The Ministry of Natural Resources (MNR) Kemptville District has carried out a preliminary review of the area in order to identify any potential natural resource and natural heritage values.

The MNR works closely with partner agencies and local municipalities in order to establish concurrent approval process and to achieve streamlined and efficient service delivery. The MNR strongly encourages all proponents to contact partner agencies (e.g. MOE, Conservation Authority, etc.) and appropriate municipalities early on in the planning process. This provides the proponent with early knowledge regarding agency requirements and approval timelines.

Natural heritage features and values contribute to the province's rich biodiversity and provide habitat for a variety of species. The following Natural Heritage values were identified:

- Fish Nursery, Smallmouth Bass Nursery Area (Non-Sensitive)
- Municipal Drain, Thomas Baxter (Dynes Br) Drain (Non-Sensitive)
- Municipal Drain, Thomas Baxter (Spence Br) Drain (Non-Sensitive)
- Pit, 4050 (Non-Sensitive)
- Pit, 608701 (Non-Sensitive)
- Pond (Non-Sensitive)

- Unevaluated Wetland (Not evaluated per OWES)

Municipal Official Plans contain additional information related to natural heritage features. Please see the local municipal Official Plan for more information such as specific policies and direction pertaining to activities which may impact natural heritage features. For planning advice or Official Plan interpretation, please contact the local municipality.

Where natural values and natural hazards exist (e.g., floodplains), there may be additional approvals and permitting required from the local Conservation Authority. The MNR strongly recommends contacting the local Conservation Authority for further information and approvals. Please see the MNR Kemptville Information Guide (2012) for contact information pertaining to Conservation Authorities located within the Kemptville District area.

For additional information and online mapping tools, please see the Natural Heritage Information Centre (NHIC), where additional data and files can be downloaded in both list and digital format. In addition sensitive species information can be requested and accessed through the NHIC at NHICrequests@ontario.ca.

In Addition, the following Fish species were identified: blackchin shiner, brook stickleback, central mudminnow, creek chub, northern redbelly dace, rock bass, smallmouth bass, spottail shiner.

As per the Natural Heritage Reference Manual (Section 13; OMNR 2010) the MNR strongly recommends that an Ecological Site Assessment be carried out to more thoroughly determine the presence of natural heritage features, and Species at Risk and their habitat located on site. The MNR can provide survey methodology for particular species at risk and their habitats. In addition, the local planning authority may have more details pertaining to the requirements of the assessment process, which will allow for the municipality to make planning decisions which are consistent with the Provincial Policy Statement (2005).

Species at Risk

With the new Endangered Species Act (ESA, 2007) in effect, it is important to understand which species and habitats exist in the area and the implications of the legislation. A review of the Natural Heritage Information Centre (NHIC) and internal records indicate that there is a potential for the following Threatened (THR) and/or Endangered (END) species on the site or in proximity to it:

- Bank Swallow (THR)
- Barn Swallow (THR)
- Blanding's Turtle (THR)
- Bobolink (THR)
- Butternut (END)
- Eastern Meadowlark (THR)
- Henslow's Sparrow (END)
- Whip poor will (THR)

All Endangered and Threatened species receive individual protection under section 9 of the ESA and receive general habitat protection under Section 10 of the ESA, 2007. Thus any potential

works should consider disturbance of possible important habitat (e.g. nesting sites). Please note that as of June 30, 2013 general habitat protection applies to all Threatened and Endangered species. The habitat of these listed species is protected from damage and destruction and certain activities may require authorization(s) under the ESA. Please keep this date in mind when planning any species and habitat surveys

Species receiving General Habitat protection:

- Barn Swallow (THR)
- Blanding's Turtle (THR)
- Bobolink (THR)
- Butternut (END)
- Eastern Meadowlark (THR)
- Henslow's Sparrow (END)
- Whip poor will (THR)

If the proposed activity is known to have an impact on the species mentioned above or any other SAR, an authorization under the Endangered Species Act, 2007 (ESA) may be required. It is recommended that MNR Kemptville be contacted prior to any activities being carried out to discuss potential survey and mitigation measures to avoid contravention of the ESA.

In Addition, one or more Special Concern species has been documented to occur either on the site or nearby. Species listed as Special Concern are not protected under the ESA, 2007. However, please note that some of these species may be protected under the Fish and Wildlife Conservation Act. Species of Special Concern for consideration:

- Common Nighthawk (SC)
- Easter Wood-Pewee (SC)
- Milksnake (SC)
- Snapping Turtle (SC)
- Wood Thrush (SC)

If any of these or any other species at risk are discovered throughout the course of the work, and/or should any species at risk or their habitat be potentially impacted by on site activities, MNR should be contacted immediately and operations be modified to avoid any negative impacts to species at risk or their habitat until further direction is provided by MNR.

Please note that information regarding species at risk is based on documented occurrences only and does not include an interpretation of potential habitat within or in proximity to the site in question. Although this data represents the MNR's best current available information, it is important to note that a lack of information for a site does not mean that additional features and values are not present. i.e.: Species at Risk (SAR) or their habitat could still be present at the location or in the immediate area. It is the responsibility of the proponent to ensure that species at risk are not killed, harmed, or harassed; or their habitat is not damaged or destroyed through the activities carried out on the site. The MNR continues to strongly encourage ecological site assessments to determine the potential for SAR habitat and occurrences. When a SAR or potential habitat for a SAR does occur on a site, it is recommended that the proponent contact the MNR for technical advice and to discuss what activities can occur without contravention of the Act. If an activity is proposed that will contravene the ESA (such as Section 9 or 10), the proponent

must contact the MNR to discuss the potential for a permit (Section 17). For specific questions regarding the Endangered Species Act (2007) or SAR, please contact a district Species at Risk Biologist at sar.kemptville@ontario.ca. For more information regarding the ESA (2007), please see attached ESA Information Sheet.

As of July 1, 2013, the approvals processes for a number of activities that have the potential to impact SAR or their habitat were changed in an effort to streamline approvals processes while continuing to protect and sustainably manage Ontario's natural resources. For those activities that require registration with the Ministry, businesses and individuals will be able to do so through a new online system. The online system will also include information to help guide individuals and businesses through the new processes. For further information on which activities are authorized through this new online registration process and how to apply, please refer to the following website: http://www.mnr.gov.on.ca/en/About/2ColumnSubPage/STDPROD_104342.html. General inquiries may be directed towards Kemptville District MNR, while questions and comments involving the new online forms can be directed to the Registry Approvals Service Centre (RASC) at 1-855-613-4256 or mnr.rasc@ontario.ca.

Please note: The advice in this letter may become invalid if:

- The Committee on the Status of Species at Risk in Ontario (COSSARO) re-assesses the status of the above-named species OR adds a species to the SARO List such that the section 9 and/or 10 protection provisions apply to those species.
- Additional occurrences of species are discovered.
- Habitat protection comes into force for one of the above-mentioned species through the creation of a habitat regulation (see general habitat protection above).

This letter is valid until: Fri. Jul 15, 2016

MNR is streamlining and automating its approvals processes for natural resource-related activities. Some activities that may otherwise contravene the ESA may be eligible to proceed without a permit from MNR provided that regulatory conditions are met for the ongoing protection of species at risk and their habitats. There are regulatory provisions for projects that have attained a specified level of approval prior to, or shortly after, the specified species or its habitat became protected under the ESA. Their requirements include registering the activity with the Ministry of Natural Resources, taking steps to immediately minimize adverse effects on species and habitat, and developing a mitigation plan. Anyone intending to use this regulatory provision is strongly advised to review Ontario Regulation 242/08 under the Endangered Species Act, 2007 for the full legal requirements.

For more information please check out the following link <http://www.ontario.ca/environment-and-energy/development-and-infrastructure-projects-and-endangered-or-threatened-species>

The MNR would like to advise, by way of this letter, that we continue to be circulated on information with regards to this project. If you have any questions or require clarification please do not hesitate to contact me.

Sincerely,



Lisa McShane
Management Biologist
lisa.mcshane@ontario.ca

Encl.\
-ESA Infosheet
-NHIC/LIO Infosheet

Appendix C

Terms of Reference



Terms of Reference

Barrhaven South Urban Expansion Study Area

Environmental Management Plan

Presented to:

Minto Communities Canada

Mattamy Homes

City of Ottawa

December 4, 2015

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1. INTRODUCTION

The Terms of Reference set out herein provide a study framework for the preparation of an Environmental Management Plan (EMP) for the Barrhaven South urban expansion study area as approved by Official Plan Amendment No. 76 (Figure 1). The study area was identified as part of the City of Ottawa's urban expansion exercise conducted as part of the Official Plan Review initiated in 2007. The area is generally located south of the existing Barrhaven community, southwest of where the Jock River meets the Rideau River. Barnsdale Road runs along the southern boundary of the study area, and is the only major road that abuts the boundary, while the Veterans Memorial Highway 416 lies to the west, Cambrian Road to the north, and Greenback Road to the east. The study area abuts the existing Barrhaven South community.

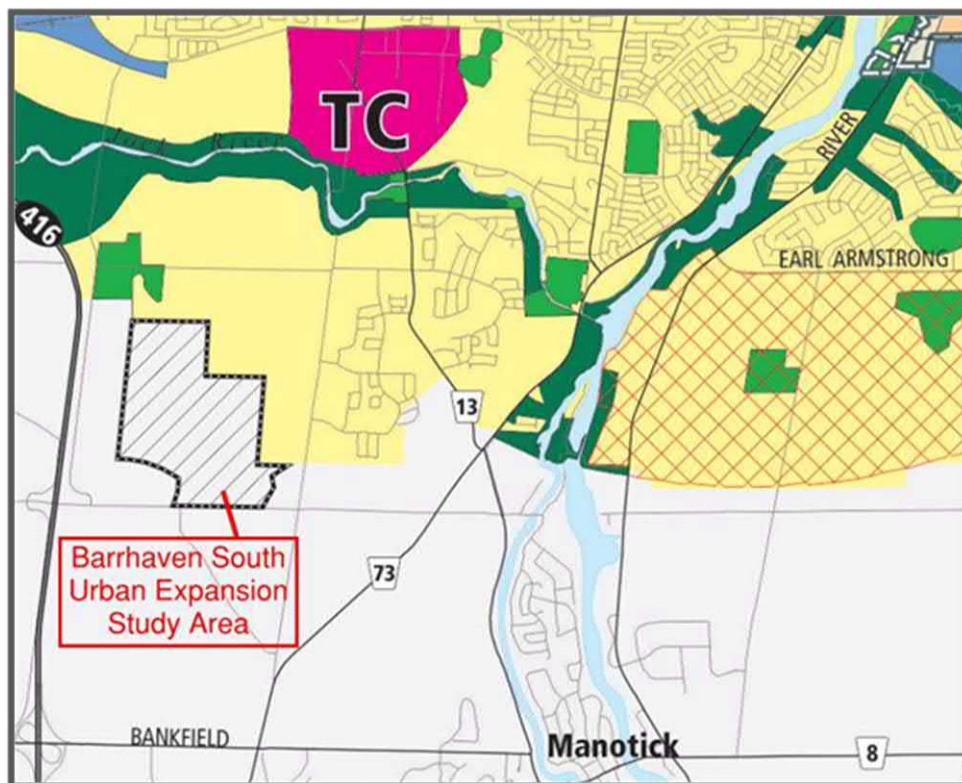


FIGURE 1 OFFICIAL PLAN SCHEDULE B – CITY OF OTTAWA URBAN POLICY PLAN

1.1 OFFICIAL PLAN POLICIES

The Official Plan policies respecting lands designated 'Urban Expansion Study Area' (Section 3.11) require a Community Design Plan (CDP) or concept plan be approved by Council prior to development proceeding. Such areas are intended to be developed primarily for residential purposes, although minor, non-residential uses may also be established to meet the needs of a neighbourhood. To support the CDP, a comprehensive Land Use Plan, a Transportation Master Plan (TMP), a Master Servicing Study (MSS), and an Environmental Management Plan (EMP) are required. Once a CDP has been established for an area, an Official Plan amendment is required to provide a General Urban Area designation. The amendment will also establish the required transportation, infrastructure, environmental and open space provisions for the area.

2. STUDY TEAM

The organization of the CDP will include a number of committees and teams to enable a collaborative study process which encompasses a range of stakeholders.

2.1 LANDOWNERS

The CDP study area is currently comprised of four major landowners. A participating Landowners Group will be established which will assume responsibility for the comprehensive planning of the entire study area. While the CDP is a developer-initiated and funded project, the City of Ottawa remains the key stakeholder and provides the regulatory framework within which the CDP will be completed.

The Barrhaven South Urban Expansion CDP study area comprises approximately 120 gross hectares of land. “Sponsoring Landowners” include Minto Communities Canada and Mattamy Homes. Consultation with non-participating landowners within the study area will be undertaken.

Drummond	20 ha (16%)
Brazeau	25 ha (21%)
Mattamy	11 ha (9%)
Minto	66 ha (54%)
TOTAL	121 ha (100%)

2.2 CORE PROJECT TEAM

A Core Project Team (CPT) will be established and comprised of the Sponsoring Landowners, the Consultant Team, and City of Ottawa staff from the Department of Planning and Growth

Management. The primary function of the CPT will be to resolve issues and achieve consensus at each step of the CDP work program.

The City of Ottawa will provide an internal project manager for coordination and guidance. The CPT will generally meet on a monthly basis in accordance with the work program and will contain representatives from the following:

Sponsoring Landowners

- Minto Communities
- Mattamy Homes

City of Ottawa

- City's CDP Project Manager.

Consulting Team

- Land Use Planning and Urban Design – FOTENN;
- Integrated Environmental Assessment – Morrison Hershfield;
- Master Servicing Study – JL Richards;
- Transportation Master Plan – Stantec Inc.;
- Environmental Management Plan – Morrison Hershfield;
- Natural Heritage – Dillon Consultants;
- Geotechnical, Hydrogeology – Paterson Group; and
- Archaeology and Heritage – Golder & Assoc.

2.3 TECHNICAL ADVISORY COMMITTEE

A Technical Advisory Committee (TAC) will also be established and will be involved on an as-needed basis (generally one meeting for each study process phase) to review information and deliverables. There will be a minimum of three TAC meetings throughout the work program.

Representatives of the following organizations will be invited to participate on the TAC:

- CPT Members (as needed);

- City of Ottawa Traffic and Parking Operations;
- City of Ottawa Parks and Recreation Branch;
- City of Ottawa Infrastructure Services;
- City of Ottawa Infrastructure Planning;
- City of Ottawa Utility Services Branch;
- City of Ottawa Transit Services;
- City of Ottawa Development Approvals Section;
- City of Ottawa Land Use & Natural Systems;
- City of Ottawa Community Planning & Urban Design Unit;
- School Boards;
- Ontario Hydro and Hydro Ottawa; and
- Government review agencies (such as Conservation Authorities, Ontario Ministry of the Environment and Climate Change (MOECC); Ontario Ministry of Natural Resources and Forestry (MNRF); Ontario Ministry of Tourism, Culture and Sport (MTCS); Ontario Ministry of Aboriginal Affairs (MAA); and Ontario Ministry of Municipal Affairs and Housing (MMAH).

The level of participation may vary depending on the role and level of interest of the individual government review agencies. For example, some government review agencies may not wish to attend all meetings of the TAC, but will be invited to provide comments on materials during each phase of the study process.

3. ENVIRONMENTAL MANAGEMENT PLAN

3.1 STUDY OBJECTIVES

The objective of this work program is to prepare an EMP for the Barrhaven South Community that identifies:

- Environmental constraints and opportunities in terms of natural heritage, and natural and man-made hazards;
- Measures to mitigate negative effects; and
- Recommendations for restoration and enhancement, which will shape the development limits.

The EMP will support the preparation of the overall CDP and servicing plans which will be undertaken in accordance with the Municipal Class Environmental Assessment (EA) process.

This work plan is intended to address the requirements of Sections 3.11, 2.4.2 and 2.4.3 of the Official Plan respecting Urban Expansion Study Areas. The planning and coordination of the infrastructure and environmental management requirements for the CDP in consultation with the community, will assist in ensuring that the objectives of the City, the community and other approval authorities are fulfilled.

3.2 STUDY PROCESS

The EMP will form part of the CDP study process which will integrate both the municipal planning and Municipal Class EA processes, therefore all infrastructure studies have been prepared in accordance with the requirements of the “Class EA”. Figure 2 shows the integration of the Class EA, CDP, and Official Plan amendment processes.

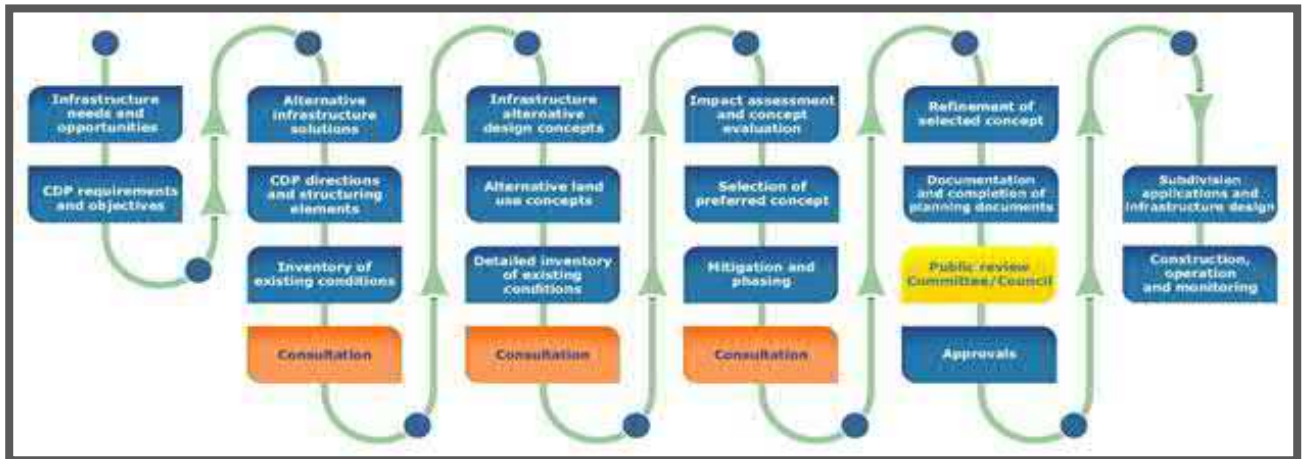


FIGURE 2 INTEGRATED COMMUNITY DESIGN PLAN AND MUNICIPAL CLASS EA PROCESSES

The required Class EA environmental planning tasks generally include:

- Identification of project need and opportunities;
- Characterization of the Existing Conditions;
- Consultation with potentially affected parties (including review agencies, and public and private interest groups);
- Identification and evaluation of alternatives;
- Identification and consideration of effects and mitigation; and
- Documentation of the planning and consultation process.

The integrated CDP and Class EA process will enable the required approvals of municipal infrastructure to occur in conjunction with municipal planning approvals (i.e. approval of the CDP and adoption of an Official Plan Amendment). Examples of municipal infrastructure that will be evaluated through the Class EA process include:

- Construction of new roads, transit facilities and/or other linear paved facilities;
- Construction of new sewage systems/pumping station(s);
- Development of stormwater management systems; and
- Establish, extend or enlarge a water distribution system and all works necessary to connect the system to an existing system or water source.

The Class EA requirements for infrastructure will be evaluated throughout the CDP process as alternative designs are developed to ensure environmental assessment requirements, if any, are met. The ability to co-ordinate the approval requirements of the *Environmental Assessment Act* and the *Planning Act* will ensure an integrated approach to the planning and development of all aspects of the community, as well as consolidate and simplify the public review and approval processes. The key benefits of an integrated planning and environmental assessment process include:

- Improving the ability to meet the requirements of both the *Planning Act* and the Class EA effectively;
- Reducing the review and approval process duplication leading to faster implementation;
- Enhancing opportunities to co-ordinate infrastructure with land use planning;
- Improving the certainty for land use decision-making; and
- Co-coordinating the appeals and objections processes.

3.3 EMP WORK PROGRAM

The background information and results of the preliminary field studies will be consolidated to identify the environmental constraints and opportunities. This will incorporate landform, soils and geology, surface water and groundwater resources, fish habitat, terrestrial vegetation, potential SAR and wildlife habitat, and other development constraints. Natural heritage features and areas that should be protected will be identified through a set of maps, including prescribed and/or appropriate setbacks from natural features. Based on preliminary field work completed, the report will also identify areas that will require further study to confirm if natural features (i.e., significant wildlife habitat) exist. In addition to setbacks identified in the mapping, additional mitigation measures will be included to address negative impacts on the Natural Heritage System or other (potential) natural features within the Study Area.

The content of the EMP will be based on these Terms of Reference as reviewed and approved by City staff in consultation with the interested Government Review Agencies. The key components are outlined in the following sections.

Each component includes a background review, associated field studies, and an analysis. Recommendations are then detailed which support the findings and analyses from each component. The study area will vary dependent on the component being considered. Boundaries will be adjusted as necessary to appropriately reflect the nature of the feature. In general, the study area will extend beyond the urban boundary expansion area, as necessary, to consider factors such as major transportation corridors, aggregate operations, drainage boundaries, natural features and water courses (Figure 3).

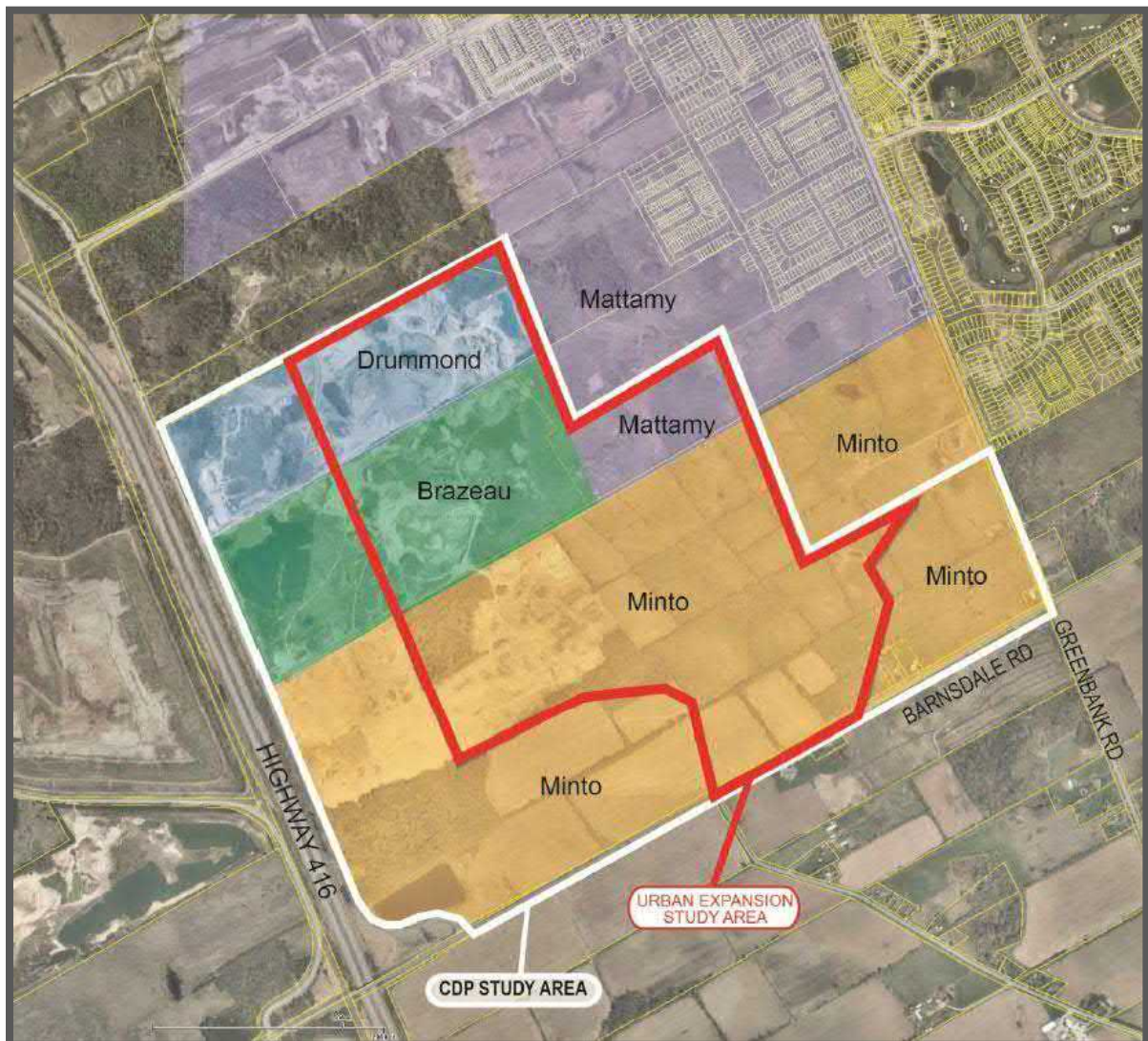


FIGURE 3 STUDY AREA

4. NATURAL HERITAGE

The following work will be undertaken to identify the appropriate natural heritage features, function and systems within the Study Area, and to provide a strategy for preservation, mitigation and implementation. The definition of the natural heritage system will affect the spatial form of the community and establish components of its overall character.

4.1 BACKGROUND REVIEW AND INITIAL AGENCY MEETINGS

A desktop review of the existing natural heritage data within 1 km of the CDP Study Area will be completed. The review will draw from previous work completed for the Study Area and the immediate surroundings, and may require meetings with agencies as necessary. The following secondary sources and their associated work will be (not limited to those listed below):

Rideau Valley Conservation Authority

- Jock River Subwatershed Report (2010);
- Jock River Reach 1 Subwatershed Plans (2007);
- Jock River Barrhaven Catchment Data Sheet (2010); and
- Lower Rideau River Subwatershed Report (2012) / RVCA Mud Creek Catchment

Ministry of Natural Resources and Forestry

- Information Request from the Kemptville District MNRF;
- Natural Heritage Information Centre Database; and
- Land Information Ontario Database

City of Ottawa

- Aerial photography and mapping;
- Official Plan (land use designations, comprehensive zoning by-law, roads and pathways, water quality);
- Environmental Strategy for the City of Ottawa (2003);

- Thomas Baxter Municipal Drain Engineer's Report; and
- Barrhaven South Community Design Plan and related studies (including Master Servicing Study, Land Use Plan, Transportation Master Plan, and Greenspace Plan)

Additional Databases

- Federal Species at Risk Public Registry
- Ontario Breeding Bird Atlas
- Ontario Nature Reptiles and Amphibians of Ontario

Additional Existing Reports

- The Natural Environment Existing Conditions Report for Realigned Greenbank Road and Southwest Transitway Extension (South to Cambrian Road) Environmental Assessment Study (MMM Group, 2013);
- Environmental Impact Statement for a Proposed Subdivision Development on 3872 Greenbank Road (McIntosh Perry, 2014);
- Barrhaven South Master Servicing Study Addendum, Draft Report (Stantec, 2014);
- Phase 1 – Environmental Site Assessment Greenbank Road and Southwest Transitway Extension (Houle Chevrier Engineering);
- Phase 1 – Environmental Site Assessment Maloughney Property (John D. Paterson and Associates, 2003);
- Phase 1 – Environmental Site Assessment 3718 & 3772 Greenbank Road (Franz Environmental, 2009); and
- Phase 1 – Environmental Site Assessment 3718 & 3771 Greenbank Road (Paterson Group, 2010)

4.2 FIELD STUDIES

Based on the resources and secondary source information studied as part of the background review, field surveys were required to confirm the presence of features identified in the Study Area. Due to the seasonal constraints associated with these surveys, a number of them have already been conducted during the spring, summer, and fall of 2015. The scope of these surveys was established through mutual agreement with the City of Ottawa prior to starting

field investigations. All surveys took place during the appropriate season and under appropriate weather conditions by qualified biologists who have been involved in several similar projects across Ontario. The field surveys were scoped to include only those areas within the CDP Study Area where data gaps from previous studies existed. Based on comments received from the City of Ottawa and the Rideau Valley Conservation Authority (RVCA), field surveys completed within the area in 2013 as part of the realigned Greenbank Road and Southwest Transitway extension project were acceptable to use as a representation for terrestrial and wildlife surveys within the Study Area. The details of the surveys conducted are outlined below.

4.2.1 AQUATIC

An aquatic assessment of the site was conducted to confirm existing aquatic/fisheries resources within the Study Area as identified in background documents. Appropriate methodology was utilized to determine the presence of any watercourses or wetlands in the Study Area.

4.2.2 TERRESTRIAL

Ecological Land Classification

Vegetation within the study area was characterized using the Ecological Land Classification System (ELC) for South Ontario (Lee et al. 1998). Where present, vegetation community boundaries were determined through the review of aerial photography, and then further refined through on-site field studies. Field Studies included the identification of dominant species for each vegetation cover type based on visual estimates of species abundances. The ELC system methodology recommends that a vegetation community be a minimum of 0.5 ha in size before it is defined.

Vegetation communities were mapped on aerial photography in accordance with ELC nomenclature to graphically represent the specific spatial pattern in the vegetation cover according to species composition, and physical characteristics. ELC information was used to identify both natural and cultural vegetation communities. Areas of anthropogenic uses such as agriculture and urban land uses were also mapped to provide a complete account of existing conditions within the Study Area.

Soil profiles for ELC involved the examination of a 120 cm hand auger soil profile. This allowed for the description of soil texture and site moisture characteristics which influence plant distributions and the resulting vegetation communities. Other physical traits such as topography and slope aspect within each community were also noted.

Tree Inventory

A Tree Inventory was conducted for the Study Area (where accessible), which included the identification of any Distinctive Trees (>50 cm Diameter at Breast Height (DBH)). Observations included areas of suitable grading, tree composition, DBH, and overall condition.

Botanical Surveys

In addition to the ELC surveys, a botanical survey was conducted within woodlands, hedgerows, meadows, and riparian areas that may serve as linkages for wildlife. At this time, SAR or rare plant species were also noted. As previously mentioned, field surveys completed within the area in 2013 were used as a good basis for terrestrial and wildlife surveys within the Study Area, however, any woodlands identified will be evaluated following the City of Ottawa's preferred protocol as previous studies in the area have not applied this criteria to the evaluation of woodlands.

Breeding Bird Surveys

To determine if birds are utilizing lands within the Study Area, breeding bird surveys were conducted within appropriate habitats (woodlands, meadows, etc.) during the 2015 field season. Surveys covered a range of breeding birds native to the area and that were expected to breed within this general area. Specific survey details are included below. Note that surveys for Species at Risk (SAR) birds were also completed in tandem with these surveys and/or as standalone surveys specific to species, and are listed in this section.

Surveys were conducted within appropriate habitats between May and July of 2015 (two surveys over this time period) for diurnal breeding birds. Specifically, surveys consisted of ten minute point counts at each station to establish quantitative estimates of bird abundance

within the Study Area. To supplement the survey, area searches of the habitat were conducted to observe species presence and breeding activity. Area searches involved noting all individual bird species and their corresponding breeding evidence while traversing the habitat on foot.

In addition to diurnal breeding bird surveys, crepuscular (i.e., species active at dawn and dusk) breeding bird surveys were undertaken to capture Nighthawk species present within the Study Area. Surveys were conducted over two visits from early May to early July of 2015 when lunar illumination was at least 50% and cloud cover was low. These surveys followed the Two-Person Auditory Survey Protocol provided by the MNRF and generally consisted of point counts where suitable habitat for target species occurred and was accessible.

Amphibians

Amphibian surveys were conducted following the Marsh Monitoring Program Protocol (Bird Studies Canada, 2009). Three different surveys were conducted between April 1 and June 30 of 2015, with at least two weeks between each survey. Surveys began at least one half hour after sunset during evenings with a minimum night temperature of 5°C, 10°C and 17°C for each of the three respective surveys.

Each amphibian survey involved standing at a predetermined station for 3 minutes and listening for amphibian calls. The calling activity was documented of individuals estimated to be within 100 m of the observation point. All individuals beyond 100 m was recorded as “outside” of the count circle and calling activity was not counted. Calling activity was then ranked using one of the following three abundance code categories:

Code 1: Calls not simultaneous, number of individuals can be accurately counted;

Code 2: Some calls simultaneous, number of individuals can reliably be estimated;

Code 3: Calls continuous and overlapping, number of individuals cannot be estimated.

In areas where appropriate habitat exists, vernal pools were visually examined for egg masses and amphibian larvae in conjunction with other field surveys. These searches occurred between April and June when amphibians concentrated around suitable breeding habitat. Searches involved walking along the perimeter of the vernal pools and wetlands, looking for egg masses or juveniles as indicators of amphibian breeding. Searches focused on submergent vegetation and woody debris where amphibians attach single eggs or masses of eggs.

4.2.3 SPECIES AT RISK

In Ontario, SAR are listed under Ontario Regulation 230/08 (the Species at Risk in Ontario List) of the Endangered Species Act, 2007 as either Extirpated, Endangered, Threatened or of Special Concern. Species listed as Extirpated, Endangered, or Threatened are provided legal protection. The following surveys were conducted specific to potential SAR present within the vicinity of the Study Area. If habitat conducive to other SAR, not flagged during initial consultation or background review, is identified during 2015 field studies, additional actions or surveys may need to be taken to address specific species.

Bobolink and Eastern Meadowlark

If potential habitat for grassland breeding birds was determined to be present during early field studies in 2015, breeding bird surveys specific to Bobolink (*Dolichonyx oryzivorus*) and Eastern Meadowlark (*Sturnella magna*) was done between June and July of 2015. Such surveys followed the Bobolink Survey Methodology provided by the MNRF. In accordance with this protocol, a total of three surveys were conducted, each beginning one half hour after dawn and ending no later than 9 am. A Dillon biologist walked parallel transects crossing the fields lengthwise at 250 m intervals stopping at pre-determined point counts to record observations and calls for ten minute intervals.

The agricultural fields will be assessed in mid 2014 for potential bobolink and eastern meadowlark habitat. If potential habitat (grasslands) were present, detailed field surveys were undertaken in June/early July following MNR sampling protocol. If the fields were tilled or planted they were assessed accordingly.

Eastern Whip-poor-will

Surveys for Eastern Whip-poor-will (*Caprimulgus vociferous*) were conducted in conjunction with Crepuscular Breeding Birds as detailed above.

Barn Swallow

In conjunction with other field surveys, the Study Area was searched for structures (i.e., barns, sheds, concrete box culverts, etc.) that may be suitable for Barn Swallow (*Hirundo rustica*) nesting. If structures were observed, searches were conducted during the breeding bird season (May- July) to determine if Barn Swallows were using the structures for nesting.

Butternut

Butternut (*Juglans cinerea*) was searched for in tandem with ELC, botanical surveys, and the tree inventory. If Butternut trees were discovered within the Study Area, a Butternut Health Assessment was conducted by a certified Butternut Health Assessor to classify the trees based on current conditions.

4.2.4 WILDLIFE

Based on the results of the ELC surveys, the potential presence of wildlife habitat in the Study Area was assessed using criteria outlined in the Significant Wildlife Habitat Technical Guide (MNRF, 2000) and the associated Ecoregion 6E Criterion Schedule (MNRF, 2012). This included further characterization of the Study Area for presence of necessary habitat structure as well as habitat of appropriate size, shape, and structure reasonably required for significant wildlife habitat to occur; as well as further investigation of ELC communities correlating to wildlife habitat listed in the Ecoregion 6E Criterion Schedule (MNRF, 2012). During this task, more species specific wildlife habitat may be identified including potential habitat for reptile nesting and overwinter (snakes and turtles), and potential bat maternity colonies. If potential significant wildlife habitat was identified within the Study Area, further studies may be required to confirm if habitat is significant.

Incidental Wildlife

Incidental observation of birds, herpetozoa, mammal, and invertebrate species were recorded during all phases of fieldwork to assist in the identification of wildlife habitat within the Study Area. In addition, trail cameras were placed at different locations on the site to record wildlife using the site that may not be observed during site visits.

4.3 ANALYSIS

Natural heritage features and areas that should be protected will be described, including prescribed and/or appropriate setbacks and field sheets will be provided. Necessary additional mitigation measures will be included to address negative impacts on the Natural Heritage System or other (potential) natural features within the Study Area.

5. DRAINAGE AND HYDROLOGY

The purpose of this component is to identify and characterize the existing drainage patterns within the study area. This will provide an understanding of the hydrology and hydraulics of the study area within the larger watershed. This information will be used to refine already established rural drainage boundaries and delineate ultimate (major and minor) drainage boundaries. This evaluation will also assist in establishing quantity control flow points and to assist with ultimate SWM design.

The impact of the development area on the receiving waters will be a critical aspect in the development of the SWM Strategy. The recommended SWM strategy will need to minimize any adverse impacts on downstream watercourses, and demonstrate that the impacts of development can be mitigated through the design of the SWM infrastructure recommended within the study area.

5.1 BACKGROUND REVIEW AND INTIAL AGENCY MEETINGS

A desktop review of the existing hydrological conditions within the CDP Study Area will be prepared. This review will draw from previous work completed for the Study Area and the immediate surroundings, and will include the following secondary source information:

- Lower Rideau River Subwatershed Strategy (RVCA, 2005)
- Jock River Reach 1 and Jock River Reach 2 Subwatershed Plans (RVCA, 2007)
- Jock River Subwatershed Report (RVCA, 2010)
- Corrigan Storm Water Management Facility (CP)(IBI Group, 2010)
- Jock River – Barrhaven Catchment Data Sheet (RVCA, 2010)
- Mud Creek Subwatershed Study Existing Conditions Report, Phase 1 (RVCA, 2011)
- Infrastructure Master Plan (City of Ottawa, 2013)
- Barrhaven South Master Servicing Study Addendum Draft Report (Stantec, November 2014)
- Site Servicing Report, Quinn's Pointe (J.L. Richards & Assoc. Ltd., 2015)
- Model Keeper Analysis for Todd Pond (J.F. Sabourin and Associates Inc., updated 2015)

- Thomas Baxter Municipal Drain Engineer's Report
- Geotechnical Reports

The review will also include additional information provided by the City of Ottawa and the RVCA, such as, but not be limited to, mapping of surficial geology, hydrography, topography, existing and upcoming topographical surveys (obtained on behalf of the Property Owner), floodplain mapping for the Jock River and Mud Creek, land use, vegetation, etc. Should information gaps be noted during the completion of this task, the Property Owner will be informed.

5.2 FIELD STUDIES

Inventory of Water Crossings

Topographical survey data, produced by Stantec Inc., will be compiled and consolidated in a standard report form for water crossings along Barnsdale Road, Greenbank Road, and Cedarview Road.

Identify and Assess Capacity of Existing Conveyance Systems

The free flowing capacity of watercourses (if any), roadside ditches, and water crossings will be calculated based on topographical maps, surveys, and servicing reports of existing developments adjacent to limits of the CDP.

Watershed Delineation

Based on background reports and topographical maps and surveys, watersheds and subwatersheds will be delineated. If applicable, attention will be given to sub-watersheds that are found to be tributary to the Jock River versus those tributary to the Thomas Baxter Municipal Drain, one of Mud's Creek tributaries.

Hydrologic Models

A hydrologic model will be developed to estimate peak flows and hydrographs under various recurrences for each sub-watershed and outlet. This analysis will be conducted with a Stormwater Management Hydrologic Model under the design storm types and recurrences (1:2 year to 1:100 year) and hydrological parameters described in the Ottawa Sewer Design Guidelines (OSDG). The analysis will consider the drainage features inventoried as part of the topographical survey (open ditch, culverts, etc.) as well as drainage divides between watersheds. Surface flows will be calculated based on the existing flow patterns for the various outlets; drainage ditches, culverts, and storm sewers, if applicable. Drainage Plans will be prepared depicting the various drainage features and sub-watershed limits as well as flow patterns and drainage patterns. Hydrological and hydraulic modeling of the study area will be used to establish the SWM criteria for the study area.

Hydrologic calculations for the Thomas Baxter Municipal Drain

Should the refinement of the watershed limits show that surface flows from part of the Study Area are currently tributary to the Thomas Baxter Municipal Drain, then there might be a need for the Property Owner to retain the services of a Drainage Engineer licensed under the Ontario Drainage Act to update the January 1967 Drainage Report. If this requirement is confirmed, JLR acting as the hydrological engineer, will coordinate and prepare information requested by the Drainage Engineer to serve as background to an amendment to the Drainage Report.

Floodplain Mapping

Although it is standard practice to hydraulically evaluate conveyance capabilities of watercourses as part of an EMP, preliminary findings showed there were no watercourses inventoried when the assessment for the “Headwater Drainage Features Guidelines” was completed. Therefore, neither floodplain mapping nor water level calculations are anticipated at this time. Should studies show defined watercourses within the Study Area, the 1:100 year floodplain would be generated based on the hydrological findings of the hydrological modeling. An additional survey would then be required to gather geodetic data of the active

channel and floodplain as well as at various water crossings. In this event, the floodplain (1:100 year) would be delineated on topographical maps.

Geomorphological Assessment

The data collected to date show that a significant portion of the surface flows are either trapped / infiltrated on-site or sheet flows to a series of open ditches and culverts. Some of the flows appear to convey westerly along Barnsdale Road towards Highway 416 and others easterly towards Greenbank Road, where the open ditch system flowing north is intercepted by the Greenbank Road trunk storm sewer system near Kilbirnie Drive. The existing condition drainage patterns will be confirmed when mapping and topographical surveys are reviewed.

It appears that there will not be any need to carry out a geomorphological assessment of the receiving stream nor to investigate potential thermal impacts. Should a need arise during the course of the preparation of the EMP or MSS, the Property Owner will retain the services of a geomorphologist to carry out a geomorphological assessment and thermal impacts would further be investigated with the assistance of the biologist.

5.3 ANALYSIS

From the background review, the existing drainage areas contributing to the Jock River and the Thomas Baxter Municipal Drain will be plotted and adjusted, if necessary, based on aerial and topographic mapping.

An existing conditions map and hydrological model will be developed based on the most up-to-date topographical information. In consultation with the City of Ottawa and RVCA, this existing conditions evaluation can be refined. The consultation with regulatory agencies will assist in determining stormwater regulatory requirements.

6. GEOTECHNICAL

The geotechnical component of the study will provide a characterization of the local physiography and geology of the subject area. The study results will be used to provide design recommendations for the CDP.

6.1 BACKGROUND REVIEW AND INITIAL AGENCY MEETINGS

The following existing studies will be reviewed for relevant information relating to the Study Area:

- Jock River – Reach 1 Subwatershed Study (Stantec, 2007)
- Mud Creek – Subwatershed Study Existing Conditions Report (Marshall Macklin Monaghan Limited / WESA, 2009)
- Lower Rideau River Subwatershed Report (2012)

The work plan for the geotechnical and hydrogeological components will be based on the requirements for the Policy Development and Urban Design Branch at the City of Ottawa and the RVCA. Further studies may be identified that are relevant to the proposed development.

6.2 FIELD STUDIES

The geotechnical field program will consist of the following:

- Test pits to delineate the surficial overburden material in three dimensions through multiple samples of the various strata retained for laboratory analyses; and
- Boreholes, which will be augered to the bedrock surface, where required, to provide the overburden soil profile and soil characterization. Boreholes will core into the bedrock, if required.

Test holes will be distributed in compliance with the “Geotechnical Investigation and Reporting Guidelines for Development Applications in the City of Ottawa” (2007).

6.3 ANALYSIS

Recommendations will be provided based on the available information and in conjunction with the experts within the other disciplines to ensure an integrated and cohesive approach to the development of the site.

The geotechnical analysis will detail the geotechnical conditions for the proposed area, a thorough interpretation of the physical setting with supporting detailed mapping, detailed test hole logs for all exploratory holes, and recommendations for the proposed development. The analysis will also consist of a macro level Grading Plan for the Concept Plans based on the constraints identified by the geotechnical engineer. Grading will be developed in accordance with the criteria described in the Design Guidelines, and will generate cut/fill volumes, on a macro level, for the Concept Plans

Existing Active Pits

In conjunction with the Hydrogeological Investigation, the existing active pits (Drummond Limited and Marcel Brazeau Limited) within the northern portion of the site will be assessed for their effects and potential implications. The MNRF aggregate licenses and pit closure protocols will be taken into account during the design of the proposed development with potential timing scenarios for pit closure to be included. Cross sections for the existing and proposed elevations for the pits will be provided with post-production filling requiring detailed grading and specifications of fill material. The implications of the pits related to the water budget will be considered.

7. HYDROGEOLOGY

The hydrogeological conditions program will collect and analyze general information in order to support the water budget, infrastructure design and constraints, and potential effects on nearby wells due to the proposed development.

7.1 BACKGROUND REVIEW AND INITIAL AGENCY MEETINGS

Similar to the Geotechnical Investigation, the following existing studies will be reviewed for relevant information relating to the Study Area:

- Jock River – Reach 1 Subwatershed Study (Stantec, 2007)
- Mud Creek – Subwatershed Study Existing Conditions Report (Marshall Macklin Monaghan Limited / WESA, 2009)
- Lower Rideau River Subwatershed Report (2012)

The work plan for the geotechnical and hydrogeological components will be based on the requirements for the Policy Development and Urban Design Branch at the City of Ottawa and the RVCA.

Further studies may be identified that are relevant to the proposed development.

7.2 FIELD STUDIES

The hydrogeological field program will be carried out in conjunction with the geotechnical program. The field program will consist of the following:

- Monitoring wells will be installed during the geotechnical field program and will also be used for the hydrogeological testing;
- Slug testing will be used to determine hydraulic conductivities and aquifer characteristics within the formation and horizons deemed necessary. Slug testing and sieve analyses will be in conjunction with the geotechnical field program;
- Locating water supply wells using MOECC well record mapping and in the field, where required;

- Sampling and monitoring sentinel water wells at key locations for groundwater chemistry (i.e. Subdivision Test Package, PHC BTEX, metals and VOCs);
- Groundwater levels will be measured and all seasonal fluctuations will be recorded; and
- Vertical and horizontal gradients will be measured.

7.3 ANALYSIS

The analysis and recommendations for all aspects of the development will be performed in conjunction with the experts within the other disciplines to ensure an integrated approach to the development and support the water budget analysis.

Evaluation of the hydrogeological conditions will consist of an evaluation of the groundwater resources encountered. The following will be provided:

- Delineation and characterization of the encountered aquifers;
- Assessment of vulnerability of the aquifers;
- Calculation of the zone of influence for potential dewatering;
- Assessment of the potential risk of impacts to the water wells from the proposed development;
- Preparation of a monitoring program for existing drinking water wells; and
- Delineation of areas where potential and actual groundwater contamination are encountered.

8. AGGREGATE RESOURCES

There are currently two (2) existing active pits (Drummond Limited and Marcel Brazeau Limited) within the northern portion of the site. The pits will be considered to assess their effects and potential implications on the study area.

8.1 BACKGROUND REVIEW AND INITIAL AGENCY MEETINGS

A desktop review of existing information will be collected including:

- Progressive and final rehabilitation plans
- Aggregate Resource designations
- MNRF aggregate licenses and pit closure protocols
- Information Request from the District MNRF (prime aggregated determination)
- City of Ottawa Official Plan land use designations
- Planning Committee Report 01 September 2011

This information will be considered in conjunction with the pit operator expectations for ongoing operation and end use expectations.

8.2 ANALYSIS

It is not the intent of the analysis to determine what is necessary to rehabilitate the active pits into developable areas, but to determine the potential opportunities and constraints they may present. This analysis will include:

- Cross sections of the existing and approved final (closure) elevations for the pits will be provided
- Setback requirements will be identified based on: existing; future; and potential cessation of, extraction activities
- The implications of the pits related to the water budget will be considered
- The implications of the pits related to area servicing will be considered in order to not preclude future development

9. ENVIRONMENTAL OPPORTUNITIES AND CONSTRAINTS

Environmental Opportunities and Constraints previously identified by the various studies undertaken as described above will be consolidated, mapped, and discussed. Constraints will include the following:

- Wetlands and watercourses;
- Floodplains;
- Vegetation community boundaries;
- Distinctive trees;
- Species at Risk;
- Woodlands;
- Breeding birds and amphibians;
- Significant wildlife habitat;
- Water crossings;
- Watershed and subwatershed boundaries;
- Recharge and discharge areas;
- Geotechnical conditions;
- Active pits and quarries;
- Hydrological resources and groundwater conditions;
- Existing drainage boundaries;
- Potential LID areas; and
- Setbacks required from any of the above.

Slope stability assessments will incorporate the geotechnical and other information to identify the geotechnical limit of the hazard lands, including the stable slope allowance plus, where appropriate, an allowance for future erosion and in some cases, an additional allowance to permit access in the event of future slope failure in accordance with City policies.

9.1 RECOMMENDATIONS

Recommendations are outlined below to support the existing conditions and analyses. Recommendations are intended to ensure the overall protection of the natural environment of the Study Area.

Setbacks

Once all natural heritage features, and natural and man-made hazards have been identified, the Rideau Valley Conservation Authority's regulated area and associated setbacks will be determined.

Mitigation Measures

Specific mitigation measures to protect significant features including natural heritage areas and natural corridors will be identified including but not limited to:

- Tree conservation and planting recommendations
- Mitigation measures for species at risk
- Incorporate opportunities to design with nature (.e.g. ecological corridor design, maintain or enhance biodiversity etc.)
- Protection and preservation of underlying aquifers
- Best management practices for infiltration (groundwater)
- Additional technical studies required

Stormwater Management Design Criteria and Objectives

SWM criteria will be developed on the basis of aquatic habitat protection and the sensitivity of receiving watercourses through consultation with the City of Ottawa and the RVCA with consideration given to the findings and recommendations of the other analyses completed as part of the EMP. Consideration will also be give to the Credi Valley Conservation Authority *Low Impact Development Stormwater Management Planning and Design Guide* and the Toronto and Region Conservation Authority *Low Impact Development Stormwater Management Planning And Design Guide*.

SWM criteria for the study area will include:

- Water budget;
- Water quality;
- Peak flow control; and
- Site grading scheme to ensure major system conveyance and respect of the grade raise restrictions.

Stormwater Management Modelling

The stormwater management modeling will take into consideration the existing hydrological and hydraulic evaluations and assessments already undertaken in the study area.

The storms used to evaluate the study area and surrounding external areas will be based on previous studies in addition to the *City of Ottawa Sewer Design Guidelines (OSDG)* (November 2004), Technical Bulletin ISDTB-2012-1 (January 31, 2012) and Technical Bulletin ISDTB-2012-4 (June 20, 2012). The establishment of the pre-development flow control points will help mitigate downstream impacts. Consideration will be taken with respect to the storm event used to evaluate the system and ensuring its compatibility with the whole Jock River Reach 1 and Mud Creek subwatersheds.

SWM parameters for hydrology modeling will be selected in compliance with the OSDG for the development area. For any parameters which are not covered by the OSDG, results of the EMP field measurements will be used to establish the parameters for the area. Similarly for hydraulic parameters, reasonable or conservative values will be utilized. If field measurements are available for the establishment of some parameters, those will be used to assist in evaluation.

Stormwater Management Systems

- Finalize capacity assessment of existing outlets using desktop calculations
- Determine minor and major system drainage boundaries
- In consultation with the hydrogeologist:

- Investigate, at the conceptual level, the integration of low impact development (LID) strategies within the UESA based on zones identified by the hydrogeologist,
- Evaluate potential infiltration measures, and
- Assess conceptually the performance of the LID strategies and infiltration measures with respect to the potential water budget deficits
- Based on the minor and major system boundaries, prepare post-development Storm Drainage Area Plan and Servicing Layout for each Concept Plan
- Pending the impacts on the Thomas Baxter Municipal Drain, there might be a need for the Owner to retain the services of a Drainage Engineer and to conduct a low flow analysis using a continuous hydrological model
- Peak flow analysis, evaluate storage volume requirements to meet the storm discharge criterion for quantity control

Peak Flow Control

Utilizing the SWM criteria, the SWM facility/facilities will be designed to provide quantity control, if necessary. The hydrological assessment, with input from RVCA, will assist in establishing the pre-development flow control points. The establishment of these points will provide the approximate discharge points for the SWM facility/facilities to service the area.

Lot level and other conveyance control within the development will be taken into consideration to reduce the peak flow and run-off volume to the SWM facility. The results of the geotechnical and hydrogeological assessments will assist in determining the feasibility of these measures and their application within the development area.

Water Budget Analysis

Urbanization may reduce groundwater recharge which in turn may reduce baseflow, leading to the impairment of aquatic habitats, as well as the water available for domestic, agricultural, or other uses. A Water Budget takes into consideration soil types, topography, vegetation cover, surface water and groundwater conditions to assess potential impacts due to

development in order to develop best management practices and determine storm water management requirements to mitigate the effects.

A Water Budget Analysis will be conducted to assess the balance between infiltration, runoff, and evapotranspiration under existing conditions. This analysis will be conducted in consultation with a hydrological engineer and will be completed in accordance with the methodology described in the “Stormwater Management Planning & Design Manual”, (MOECC, 2003) using Environment Canada’s Thornthwaite Climatic Water Balance information derived from 30 years of monthly data. This Water Budget Analysis will be used as a baseline condition as part of the Master Servicing Study to predict and evaluate the potential changes to the hydrologic cycle resulting from urbanization.

Site specific Water Budget analysis will be provided based on the findings of the Hydrogeological and Geotechnical assessments of the study area.

The Water Budget will:

- Describe the Jock River and Mud Creek subwatersheds water balance under existing pre-development conditions;
- Assess the anticipated changes to the water budget associated with the proposed Barrhaven South expansion development; and
- Provide an evaluation of the feasibility of achieving water balance through stormwater management.

Water Quality and Erosion Control

Based on the findings of the natural heritage assessment and in consultation with the RVCA, water quality treatment level will be determined. In addition to level of protection to be provided through the SWM facility design, further water quality protection measures to mitigate baseflow discharge, thermal considerations and erosion concerns within the recipient watercourses will be evaluated.

9.2 CONCLUSIONS

Through the consolidation of the above project components, the Environmental Management Plan will identify management actions necessary to protect and enhance the Study Area's natural features and ecological functions, as well as actions necessary to rehabilitate areas where the natural features and ecological functions have been degraded.

The EMP will be developed through a step by step process in conjunction with the Community Design Plan, the Transportation Master Plan, and the Master Servicing Study. The CDP, TMP and MSS will develop and evaluate alternative land uses and infrastructure alternatives in accordance with the Municipal Class EA process. The findings of the EMP will inform the design considerations and evaluation criteria to be considered in the Plans and Studies.

The resulting documentation will identify timing, costs and staging of recommended works, including any interim solutions. The approval requirements and process for implementation will also be outlined.

The final version of the Environmental Management Plan shall be submitted in PDF, and all mapping shall be submitted in GIS format, with shape files and metadata forwarded to the City of Ottawa.

Appendix D

Headwater Drainage Features Assessment

ROAD CROSSING ID	SITE VISIT	DATE OF FIELD WORK	FLOW ASSESSMENT	VEGETATION ASSESSMENT		CHANNEL FORM				SEDIMENT TRANSPORT		COMMENTS	PHOTO REFERENCES
			FLOW INFLUENCE (FI) / CONDITION (FC) / TYPE (FT)	RIPARIAN	TERRESTRIAL	AVERAGE WETTED WIDTH (m)	AVERAGE DEPTH (m)	AVERAGE BANKFULL WIDTH (m)	SUBSTRATE*	SEDIMENT TRANS.	SEDIMENT DEP.**		
LOWER RIDEAU SUBWATERSHED- MUD CREEK CATCHMENT													
MC1	1	21-Mar-16	Flow observed FI: Freshet (1) FC: Subs. Flow (5) FT: Defined Natural Channel (1)	Meadow (4)	Forest (6)	8.32	>1	>10	Cl, Si (estimated)	Rill and Gully	Substantial	- Water was very murky making it difficult to estimate depth - Watercourse was too large to safely enter to measure (Mud Creek bridge crossing at Bankfield) - Suitable fish habitat present - No barriers to fish habitat observed	1, 3, 4, 6
	2	30-Jun-16	Flow observed FI: Baseflow (3) FC: Subs. Flow (5) FT: Defined Natural Channel (1)	Conditions similar to Site Visit 1							- Water murky - Flow was high despite lack of rain	2, 5	
MC2	1	21-Mar-16	Flow observed FI: Freshet (1) FC: Subs. Flow (5) FT: Defined Natural Channel (1)	Meadow (4)	Forest (6)	3.29	0.27	3.46	Sa, Gr	Instream Bank Erosion, Rill and Gully	Substantial	- Undercut banks and erosion apparent - Constriction at concrete box culvert where channel narrows and turns sharply into culvert - Steep banks (obvious entrenchment) - Downstream side is similar with pool/riffle morphology with cobble substrate - Meandering stream with erosion and undercutting - Suitable fish habitat present	7, 9, 10, 11, 13
	2	30-Jun-16	Flow observed FI: Baseflow (3) FC: Min. Flow (4) FT: Defined Natural Channel (1)	Conditions similar to Site Visit 1							- Flow not as apparent although water is present despite high temperatures and lack of rain - Algae present	8, 12, 14	
MC3	1	21-Mar-16	Flow observed FI: Freshet (1) FC: Subs. Flow (5) FT: Defined Natural Channel (4)	Meadow (4)	Scrubland (5)/ None (1)	1.82	0.345	2.7	Gr, Bo	Instream Bank Erosion, Rill and Gully	Substantial	- Natural meandering channel with flowing inputs (rills/ tile drains) - Main input contained red staining (iron) depositing into the channel - Riparian area and inputs were covered in ice so it was difficult to determine if natural or tile drains - Culvert undersized with significant erosion (widening of watercourse on either side of the culvert upstream) - Water was murky, undercut banks - Fish habitat potential	15, 17, 19, 22
	2	30-Jun-16	Flow observed FI: Baseflow (3) FC: Standing Water (2) FT: Defined Natural Channel (4)	Meadow (4)	Scrubland (5)/ None (1)	0.80	0.10	2.7	Gr, Bo	None	None	- Channel significantly more narrow - Water stagnant and only damp substrates downstream- evidence of intermittent flows by presence of duckweed in channel bottom - Fish present at upstream end of culvert (likely Brook Stickleback)	18, 20, 21, 23, 24

ROAD CROSSING ID	SITE VISIT	DATE OF FIELD WORK	FLOW ASSESSMENT	VEGETATION ASSESSMENT		CHANNEL FORM				SEDIMENT TRANSPORT		COMMENTS	PHOTO REFERENCES
			FLOW INFLUENCE (FI) / CONDITION (FC) / TYPE (FT)	RIPARIAN	TERRESTRIAL	AVERAGE WETTED WIDTH (m)	AVERAGE DEPTH (m)	AVERAGE BANKFULL WIDTH (m)	SUBSTRATE*	SEDIMENT TRANS.	SEDIMENT DEP.**		
MC4	1	21-Mar-16	Flow observed FI: Freshet (1) FC: Subs. Flow (5) FT: Channelized or Constrained (2)	Forest (6)	Lawn (2)	3.97	0.56	4.4	Si, Muck (organic)	Rill, Outlet Scour (downstream side)	Moderate	- Culvert undersized, erosion at mouth on upstream side - Outlet scour on downstream side - Water clear with some algae present in the bottom of the channel - Nearby residences - Fresh spray paint on road marking culvert (replacement?)	25, 27, 28
	2	30-Jun-16	No flow observed during 2 nd site assessment.									- Damp substrate with some sparse vegetation growing - Fish habitat potential low due to barriers upstream and intermittent nature of stream	26, 29, 30
MC5	1	21-Mar-16	Flow observed FI: Freshet (1) FC: Standing Water (2) FT: Channelized or Constrained (2)	None (1)/ Lawn (2)	Cropped (3)/ None (1)	3.9	0.44	4.25	Si, Sa	Outlet Scour (downstream)	Minimal	- Upstream flows from MC4 across agricultural fields with no riparian veg. (tilled to watercourse) - Culvert at William McEwen road has been crushed in with debris (logs/ fence posts) blocking the inlet - Alignment of culvert on downstream side seems off- work done on to accommodate residential laneway causing a gap between road culvert and driveway culvert where stagnant water is pooling - Flows northeast across a residential property with mown lawn right to the water, adjacent to laneway - Flows are near level with mown grass on downstream side (at capacity) - Algae present	31, 32, 33, 35, 36, 38, 40
	2	30-Jun-16	No flow observed during 2 nd site assessment.									- Upstream side near blocked culvert had standing water with duckweed - Downstream channel was dry with grasses growing - Does not likely contain fish habitat due to barrier (blocked culvert) upstream and intermittent nature	34, 37, 39
MC6	1	21-Mar-16	Flow observed FI: Freshet (1) FC: Standing Water (2) FT: Channelized or Constrained (2)	Meadow (4)	Meadow (4)	2	0.36	2.67	Si, Sa	None	None	- Crossing beneath Highway 416 not accessible due to fence - Flows into roadside ditch through meadow along highway berm - No flow detected	41, 42
	2	30-Jun-16	No flow observed during 2 nd site assessment.									- Densely vegetated ditch with meadow grasses	N/A
MC7	1	21-Mar-16	Flow observed FI: Freshet (1) FC: Min. Flow (4) FT: Channelized or Constrained (2)	Meadow (4)	Meadow (4)	2.76	0.31	3.06	Si, Sa	Other (road)	Minimal	- Murky water, corrugated steel culvert - Flows from roadside ditch downstream of MC6 across a meadow area adjacent to Highway 416 before crossing east beneath the highway	43, 45, 46

ROAD CROSSING ID	SITE VISIT	DATE OF FIELD WORK	FLOW ASSESSMENT	VEGETATION ASSESSMENT		CHANNEL FORM				SEDIMENT TRANSPORT		COMMENTS	PHOTO REFERENCES
			FLOW INFLUENCE (FI) / CONDITION (FC) / TYPE (FT)	RIPARIAN	TERRESTRIAL	AVERAGE WETTED WIDTH (m)	AVERAGE DEPTH (m)	AVERAGE BANKFULL WIDTH (m)	SUBSTRATE*	SEDIMENT TRANS.	SEDIMENT DEP.**		
	2	30-Jun-16	No flow observed during 2 nd site assessment.									- Densely vegetated, ditch meadow grasses - Fish habitat not likely present due to ephemeral nature of flows and origins (roadside ditches)	44, 47
MC8	1	21-Mar-16	Flow observed FI: Freshet (1) FC: Subs. Flow (5) FT: Channelized or Constrained (2)	Meadow (4)	Forest (6)/ None (1)	1.87	0.335	2.3	Si, Sa	Instream Bank Erosion	Minimal	- Murky water flowing downstream from MC7 along a roadside ditch on Bankfield Road - Also collecting water from south ditch flowing down Bankfield Road (many tributaries converge in this area) - A watercourse flowing south outlets into MC8 between Highway 416 and the culvert crossing - Water outletting into MC8 is clear but causing erosion where it meets the roadside ditch and flow changes direction - Large culvert crossing flowing from the north side (ditch) of Bankfield Road into a natural meandering channel - Cobbles/boulders are present at the mouth of the culvert - No obvious scouring of sediment deposition - Fish and amphibian breeding habitat potential	48, 50, 52, 54, 55, 56, 57, 60, 61
	2	30-Jun-16	Flow observed FI: Baseflow (3) FC: Standing Water (2) FT: Channelized or Constrained (2)	Conditions similar to Site Visit 1							- Roadside ditched upstream were dry and densely vegetated - Culvert crossing contained standing water with algae despite dry weather conditions - Fish present at culvert (likely Brook Stickleback) - Amphibians heard calling downstream (south of Bankfield Road)	49, 51, 53, 58, 59	
LOWER RIDEAU SUBWATERSHED- HOGS BACK CATCHMENT													
HB1	1	23-Mar-16	Flow observed FI: Freshet (1) FC: Min. Flow (4) FT: Channelized or Constrained (2)	Meadow (4)	Cropped (3)	0.75	0.12	1	Sa, Gr	None	None	- Culvert appears to be sitting high- nearly perched on both the upstream and downstream sides and doesn't match the stream grade - Densely vegetated within minimal flow in the actual channel- fast flows just downstream of culvert mouth where channel is constricted by vegetation	62, 64, 66, 68
	2	30-Jun-16	No flow observed during 2 nd site assessment.									- Densely vegetated - Fish habitat not likely present due perching of culvert, barriers downstream, and ephemeral nature	63, 65, 67

ROAD CROSSING ID	SITE VISIT	DATE OF FIELD WORK	FLOW ASSESSMENT	VEGETATION ASSESSMENT		CHANNEL FORM				SEDIMENT TRANSPORT		COMMENTS	PHOTO REFERENCES
			FLOW INFLUENCE (FI) / CONDITION (FC) / TYPE (FT)	RIPARIAN	TERRESTRIAL	AVERAGE WETTED WIDTH (m)	AVERAGE DEPTH (m)	AVERAGE BANKFULL WIDTH (m)	SUBSTRATE*	SEDIMENT TRANS.	SEDIMENT DEP.**		
HB2	1	23-Mar-16	Flow observed FI: Freshet (1) FC: Standing Water (2) FT: Channelized or Constrained (2)	Meadow (4)	Cropped (3)	3.34	0.41	3.85	Si, Sa	Sheet Erosion	Minimal	- Ditch flowing along an old abandoned laneway toward culvert at Prince of Wales Drive (different pattern than shown in provincial watercourse mapping), suggesting alteration at some point - Large pool of stagnant water on upstream side adjacent to laneway - Strong odour with garbage present - Culvert was approximately 2/3 filled with water at the time of the site visit (undersized)	69, 70, 71, 72
	2	30-Jun-16	No flow observed during 2 nd site assessment.									- Densely vegetated	73
HB3	1	23-Mar-16	Flow observed FI: Freshet (1) FC: Subs. Flow (5) FT: Channelized or Constrained (2)	Meadow (4)	Meadow (4)	0.82	0.20	1.46	Sa, Gr	None	Minimal	- Fish habitat potential, deep, good flow, gravel bottom with riparian cover (dense overhanging meadow grasses) - Culvert size appears to be appropriate	74, 76, 77
	2	30-Jun-16	No flow observed during 2 nd site assessment.									- Densely vegetated, may provide fish habitat in spring	75, 78
HB4	1	23-Mar-16	Flow observed FI: Freshet (1) FC: Standing Water (2) FT: Channelized or Constrained (2)	Meadow (4)	Scrubland (5)/ Cropped (3)	1.9	0.15	2.34	Si, Sa	Sheet Erosion	Minimal	- Culvert is at a T-intersection of flows from roadside ditch and flows from the west - Stagnant/ nil flow - Tile drain to the southwest of the culvert flowing into ditch - Culvert partially clogged with grasses	79, 80, 81
	2	30-Jun-16	No flow observed during 2 nd site assessment.									- Dry and densely vegetated	82
HB5	1	23-Mar-16	Flow observed FI: Freshet (1) FC: Standing Water (2) FT: Channelized or Constrained (2)	Meadow (4)	Scrubland (5)/ None (1)	1.1	0.10	1.6	Si, Sa	None	None	- Flow trickling out of culvert downstream (grade change?) - Culvert partially plugged with meadow grasses - Flows along a roadside ditch - Utility pole (new) laying in ditch	83-85, 87-90, 92
	2	30-Jun-16	No flow observed during 2 nd site assessment.									- Completely dry, ditch partially filled with soil from pole installation - Not likely to provide fish habitat	86, 91

MUD CREEK SUBWATERSHED AQUATIC HABITAT ASSESSMENT PHOTOS

Photo 1

March 21, 2016

Notes:

MC1

Site Visit #1

Looking upstream
(Mud Creek) from
bridge crossing on
Bankfield Road



Photo 2

June 30, 2016

Notes:

MC1

Site Visit #2

Looking upstream
(Mud Creek) from
bridge crossing on
Bankfield Road



Photo 3

March 21, 2016

Notes:

MC1

Site Visit #1

Upstream side of
bridge at Bankfield
Road



Photo 4

March 21, 2016

Notes:

MC1

Site Visit #1

Looking Downstream



Photo 5

June 30, 2016

Notes:

MC1

Site Visit #2

Looking Downstream



Photo 6

March 21, 2016

Notes:

MC1

Site Visit #1

Downstream side of
bridge at Bankfield
Road



Photo 7

March 21, 2016

Notes:
MC2
Site Visit #1
Looking upstream



Photo 8

June 30, 2016

Notes:
MC2
Site Visit #2
Looking upstream



Photo 9

March 21, 2016

Notes:

MC2

Site Visit #1

Upstream side of
culvert looking
downstream toward
First Line Road



Photo 10

March 21, 2016

Notes:

MC2

Site Visit #1

Upstream side of
culvert looking
downstream toward
First Line Road



Photo 11

March 21, 2016

Notes:

MC2

Site Visit #1

Looking downstream
from First Line Road



Photo 12

June 30, 2016

Notes:

MC2

Site Visit #2

Looking downstream
from First Line Road



Photo 13

March 21, 2016

Notes:

MC2

Site Visit #1

Looking downstream
from First Line Road



Photo 14

June 30, 2016

Notes:

MC2

Site Visit #2

Looking downstream
from First Line Road

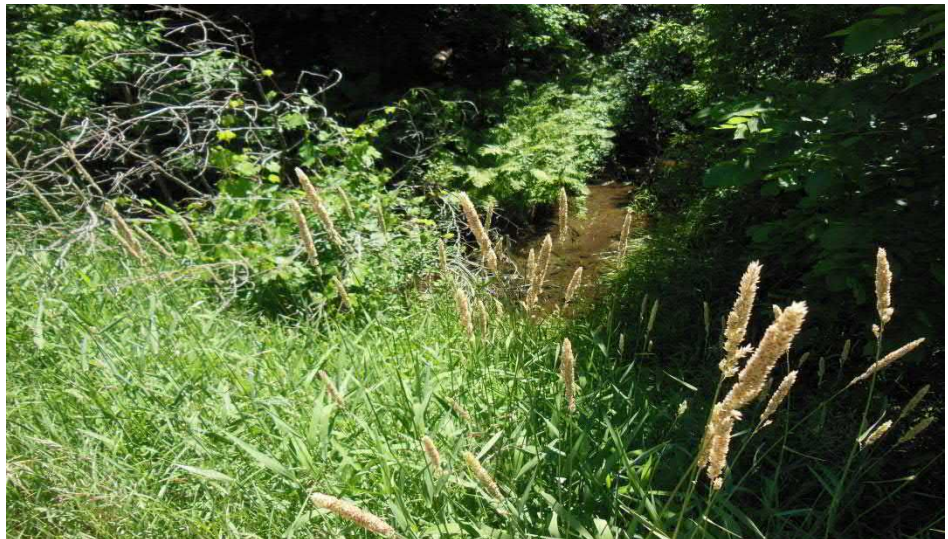


Photo 15

March 21, 2016

Notes:
MC3
Site Visit #1
Looking upstream



Photo 16

June 30, 2016

Notes:
MC3
Site Visit #2
Looking upstream



Photo 17

March 21, 2016

Notes:

MC3

Site Visit #1

Looking downstream
into culvert



Photo 18

June 30, 2016

Notes:

MC3

Site Visit #2

Looking down from
top of culvert at the
upstream side. Fish
present.



Photo 19

March 21, 2016

Notes:

MC3

Site Visit #1

Downstream side of
crossing



Photo 20

June 30, 2016

Notes:

MC3

Site Visit #2

Downstream



Photo 21

June 30, 2016

Notes:

MC3

Site Visit #2

Looking down from
top of culvert at the
downstream side



Photo 22

March 21, 2016

Notes:

MC3

Site Visit #1

Looking downstream



Photo 23

June 30, 2016

Notes:

MC3

Site Visit #2

Looking downstream



Photo 24

June 30, 2016

Notes:

MC3

Site Visit #2

Downstream

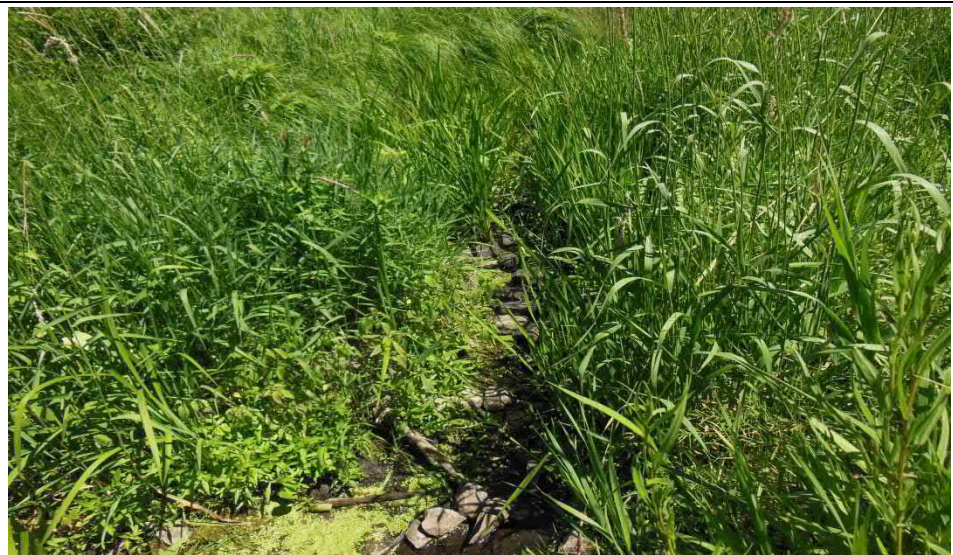


Photo 25

March 21, 2016

Notes:

MC4

Site Visit #1

Looking upstream
from Century Road



Photo 26

June 30, 2016

Notes:

MC4

Site Visit #2

Looking upstream
from Century Road



Photo 27

March 21, 2016

Notes:

MC4

Site Visit #1

Looking downstream
into culvert



Photo 28

March 21, 2016

Notes:

MC4

Site Visit #1

Looking downstream
from Century Road



Photo 29

June 30, 2016

Notes:

MC4

Site Visit #2

Looking downstream
from Century Road



Photo 30

June 30, 2016

Notes:

MC4

Site Visit #2

Looking downstream
from Century Road



Photo 31

March 21, 2016

Notes:

MC5

Site Visit #1

Downstream side of
culvert looking
towards
driveway/laneway



Photo 32

March 21, 2016

Notes:

MC5

Site Visit #1

Downstream side of
culvert looking
upstream towards
William McEwen
Road



Photo 33

March 21, 2016

Notes:

MC5

Site Visit #1

Looking upstream
from laneway



Photo 34

June 30, 2016

Notes:

MC5

Site Visit #2

Looking upstream
from laneway



Photo 35

March 21, 2016

Notes:

MC5

Site Visit #1

Upstream where
stream crosses
residential property



Photo 36

March 21, 2016

Notes:

MC5

Site Visit #1

Upstream side of
laneway culvert
(straw bales visible)



Photo 37

June 30, 2016

Notes:

MC5

Site Visit #2

Upstream side of
laneway culvert
(straw bales visible)



Photo 38

March 21, 2016

Notes:

MC5

Site Visit #1

Upstream side of
culvert (caved in and
blocked up)



Photo 39

June 30, 2016

Notes:

MC5

Site Visit #2

Looking upstream
from William
McEwen Road



Photo 40

March 21, 2016

Notes:

MC5

Site Visit #1

Looking upstream
from William
McEwen Road



Photo 41

March 21, 2016

Notes:
MC6
Site Visit #1
Upstream



Photo 42

March 21, 2016

Notes:
MC6
Site Visit #1
Looking downstream
in roadside ditch



Photo 43

March 21, 2016

Notes:

MC7

Site Visit #1

Looking upstream
into culvert



Photo 44

June 30, 2016

Notes:

MC7

Site Visit #2

Looking downstream
toward Highway 416



Photo 45

March 21, 2016

Notes:

MC7

Site Visit #1

Looking upstream in
ditch on east side of
road



Photo 46

March 21, 2016

Notes:

MC7

Site Visit #1

Looking downstream
toward culvert
passing under
Highway 416



Photo 47

June 30, 2016

Notes:

MC7

Site Visit #2

Looking downstream
toward culvert
passing under
Highway 416



Photo 48

March 21, 2016

Notes:

MC8

Site Visit #1

Looking north up
tributary outletting
into roadside ditch
upstream of culvert



Photo 49

June 30, 2016

Notes:

MC8

Site Visit #2

Looking north up
tributary outletting
into roadside ditch
upstream of culvert



Photo 50

March 21, 2016

Notes:

MC8

Site Visit #1

Looking north up
tributary outletting
into roadside ditch
upstream of culvert



Photo 51

June 30, 2016

Notes:

MC8

Site Visit #2

Upstream of culvert
looking north at
tributary outletting
into roadside ditch



Photo 52

March 21, 2016

Notes:

MC8

Site Visit #1

Convergence of
tributaries, erosion
and sedimentation,
looking south toward
Bankfield Road



Photo 53

June 30, 2016

Notes:

MC8

Site Visit #1

Convergence of
tributaries on the
north side of
Bankfield Road



Photo 54

March 21, 2016

Notes:

MC8

Site Visit #1

Looking upstream on
the north side of
Bankfield Road



Photo 55

March 21, 2016

Notes:

MC8

Site Visit #1

Looking downstream
on the north side of
Bankfield Road
towards culvert



Photo 56

March 21, 2016

Notes:

MC8

Site Visit #1

Looking downstream
on the south side of
Bankfield Road
towards culvert



Photo 57

March 21, 2016

Notes:

MC8

Site Visit #1

Upstream at culvert
on Bankfield Road



Photo 58

June 30, 2016

Notes:

MC8

Site Visit #2

Upstream at culvert
on Bankfield Road



Photo 59

June 30, 2016

Notes:

MC8

Site Visit #2

Upstream at culvert
on Bankfield Road,
fish present



Photo 60

March 21, 2016

Notes:

MC8

Site Visit #1

Looking downstream
(south) from
Bankfield Road.



Photo 61

March 21, 2016

Notes:

MC8

Site Visit #1

Looking downstream
(south) from
Bankfield Road.



JOCK RIVER SUBWATERSHED

Photo 62

March 23, 2016

Notes:

JR1

Site Visit #1

Upstream (north)
side of Barnsdale
Road. Ditch flowing
into perched culvert.



Photo 63

June 30, 2016

Notes:

JR1

Site Visit #2

Upstream (north)
side of Barnsdale
Road. Ditch flowing
into perched culvert.



Photo 64

March 23, 2016

Notes:

Tributary 1A

Site Visit #1

Upstream (north)
side of Barnsdale
Road. Ditch flowing
into perched culvert.



Photo 65

June 30, 2016

Notes:

JR1

Site Visit #2

Upstream (north)
side of Barnsdale
Road. Ditch flowing
into perched culvert.



Photo 66

March 23, 2016

Notes:

JR1

Site Visit #1

Downstream- south
side of Barnsdale
Road.



Photo 67

June 30, 2016

Notes:

JR1

Site Visit #2

Downstream- south
side of Barnsdale
Road.



Photo 68

March 23, 2016

Notes:

JR1

Site Visit #1

Downstream- south
side of Barnsdale
Road.



Photo 69

March 23, 2016

Notes:

JR2

Site Visit #1

Upstream (west) side
of Prince of Wales
Drive- stagnant pool
with odour



Photo 70

March 23, 2016

Notes:

JR2

Site Visit #1

Upstream (west) side
of Prince of Wales
Drive- stagnant pool
with odour



Photo 71

March 23, 2016

Notes:

JR2

Site Visit #1

Downstream (east)
side of Prince of
Wales Drive.



Photo 72

March 23, 2016

Notes:

JR2

Site Visit #1

Downstream (east)
side of Prince of
Wales Drive.



Photo 73

June 30, 2016

Notes:

JR2

Site Visit #2

Downstream (east)
side of Prince of
Wales Drive.



Photo 74

March 23, 2016

Notes:

JR3

Site Visit #1

Looking upstream
towards Greenbank
Road from Prince of
Wales Road



Photo 75

June 30, 2016

Notes:

JR3

Site Visit #2

Looking upstream
towards Greenbank
Road from Prince of
Wales Road



Photo 76

March 23, 2016

Notes:

JR3

Site Visit #1

Looking upstream
towards Greenbank
Road from Prince of
Wales Road



Photo 77

March 23, 2016

Notes:

JR3

Site Visit #1

Looking at
downstream side of
culvert



Photo 78

March 23, 2016

Notes:

JR3

Site Visit #1

Looking at
downstream side of
culvert



Photo 79

March 23, 2016

Notes:

JR4

Site Visit #1

Looking upstream
from Greenbank
Road.



Photo 80

March 23, 2016

Notes:

JR4

Site Visit #1

Looking upstream
(south) up the
western side of
Greenbank Road
(ditch).



Photo 81

March 23, 2016

Notes:

JR4

Site Visit #1

Looking upstream
(north) up the
western side of
Greenbank Road
(ditch). Tile drain
outlet present
flowing into ditch



Photo 82

June 30, 2016

Notes:

JR4

Site Visit #2

Looking upstream
from Greenbank
Road.



Photo 83

March 23, 2016

Notes:

JR5

Site Visit #1

Looking into culvert
(downstream) from
the west side of
Greenbank Road.



Photo 84

March 23, 2016

Notes:

JR5

Site Visit #1

Downstream side of
culvert- east side of
Greenbank Road



Photo 85

March 23, 2016

Notes:

JR5

Site Visit #1

Upstream side in
roadside ditch.



Photo 86

June 30, 2016

Notes:

JR5

Site Visit #2

Upstream side –
utility pole installed-
soil filling ditch-
difficult to locate the
culvert



Photo 87

March 23, 2016

Notes:

JR5

Site Visit #1

Upstream ditch west
side of Greenbank
Road

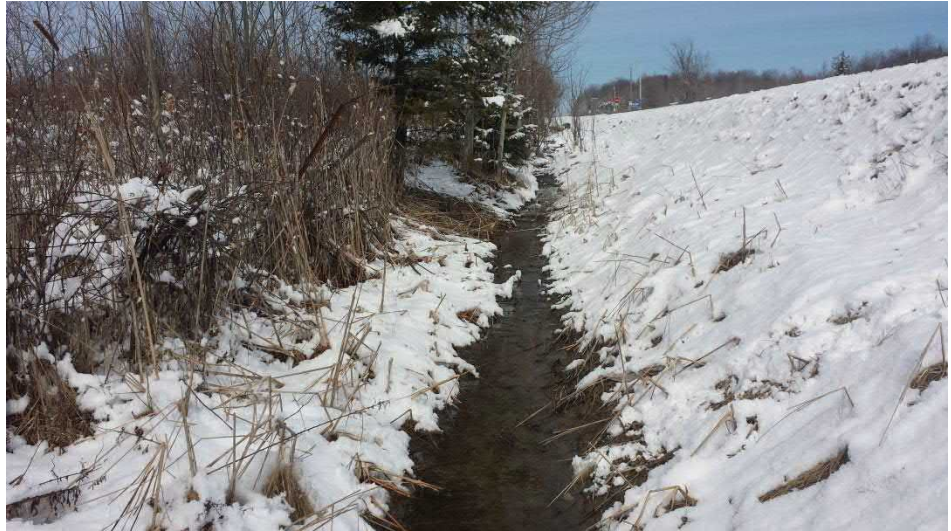


Photo 88

March 23, 2016

Notes:

JR5

Site Visit #1

Downstream side of
culvert- east side of
Greenbank Road



Photo 89

March 23, 2016

Notes:

JR5

Site Visit #1

Looking downstream
from Greenbank
Road



Photo 90

March 23, 2016

Notes:

JR5

Site Visit #1

Downstream side of
culvert- east side of
Greenbank Road



Photo 91

June 30, 2016

Notes:

JR5

Site Visit #2

Disturbed area to the north of culvert



Photo 92

March 23, 2016

Notes:

JR5

Site Visit #1

Downstream side of culvert- east side of Greenbank Road



Appendix E

Site Photos

Ecological Land Classification Photos

Photo 1

September 28, 2015

Notes:
Dry-Fresh White Ash
– Hardwood
Deciduous Forest
Type (FODM4-2)



Photo 2

June 26, 2015

Notes:
Dry-Fresh Sugar
Maple Deciduous
Forest Ecosite
(FODM5)






Photo 3

September 28, 2015

Notes:
Dry-Fresh Sugar
Maple Deciduous
Forest Ecosite
(FODM5)



<p>Photo 4</p> <p>June 26, 2015</p> <p>Notes: Regenerating Forb Meadow (MEFM1)</p>	
<p>Photo 5</p> <p>September 26, 2016</p> <p>Notes: Regenerating Forb Meadow (MEFM1) Disturbed due to adjacent aggregate extraction activities</p>	
<p>Photo 6</p> <p>October 31, 2017</p> <p>Notes: Regenerating Forb Meadow (MEFM1) Disturbed due to adjacent aggregate extraction activities</p>	

<p>Photo 7</p> <p>June 26, 2015</p> <p>Notes: Cleared Land</p>	
<p>Photo 8</p> <p>June 26, 2015</p> <p>Notes: Cleared Land</p>	
<p>Photo 9</p> <p>September 26, 2016</p> <p>Notes: Fencerow TAGM5</p>	

Photo 10

June 26, 2015

Notes:
Native Mixed
Regeneration Thicket
Type (THMM1-1)



Appendix F

Vegetation List

Scientific Name	Common Name	S-Rank	Coefficient Conservation	Coefficient Wetness
<i>Acer negundo</i>	Manitoba Maple	S5	0	-2
<i>Acer saccharum</i>	Sugar Maple	S5	4	3
<i>Achillea millefolium</i>	Common Yarrow	SE	---	3
<i>Actaea rubra</i>	Red Baneberry	S5	5	5
<i>Amelanchier sp</i>	Serviceberry Species	---	---	---
<i>Arctium minus</i>	Common Burdock	SNA	---	5
<i>Aruncus dioicus</i>	Common Goatsbeard	SNA	---	3
<i>Asclepias syriaca</i>	Common Milkweed	S5	0	5
<i>Carex intumescens</i>	Bladder Sedge	S5	6	-4
<i>Carex pensylvanica</i>	Pennsylvania Sedge	S5	5	5
<i>Carex sp</i>	Sedge Species	---	---	---
<i>Carya cordiformis</i>	Bitternut Hickory	S5	6	0
<i>Cerastium fontanum</i>	Common Mouse-ear Chickweed	SNA	---	3
<i>Circaea canadensis</i>	Broad-leaved Enchanter's Nightshade	S5	3	3
<i>Cirsium arvense</i>	Canada Thistle	SNA	---	3
<i>Cirsium vulgare</i>	Bull Thistle	SNA	---	4
<i>Crataegus sp</i>	Hawthorn sp	---	---	---
<i>Dactylis glomerata</i>	Orchard Grass	SNA	---	3
<i>Dianthus armeria</i>	Deptford Pink	SNA	---	5
<i>Epipactis helleborine</i>	Eastern Helleborine	SNA	---	5
<i>Equisetum arvense</i>	Field Horsetail	S5	0	0
<i>Erigeron annuus</i>	Annual Fleabane	S5	0	1
<i>Erigeron canadensis</i>	Canada Horseweed	S5	0	1
<i>Erucastrum gallicum</i>	Common Dogmustard	SNA	---	5
<i>Fragaria virginiana</i>	Wild Strawberry	S5	2	1
<i>Fraxinus americana</i>	White Ash	S4	4	3
<i>Galium mollugo</i>	Smooth Bedstraw	SNA	---	5
<i>Geranium robertianum</i>	Herb-Robert	S5	---	5
<i>Geum canadense</i>	White Avens	S5	3	0
<i>Hieracium pilloseloides</i>	King Devil Hawkweed or Smooth Yellow Hawkweed	SNA	---	5
<i>Hieracium sp</i>	Hawkweed Species	---	---	---
<i>Hordeum jubatum</i> ssp. <i>jubatum</i>	Foxtail Barley	S5	---	-1
<i>Hypericum perforatum</i>	Common St. John's-wort	SNA	---	5
<i>Juniperus communis</i>	Ground Juniper	S5	4	3

Scientific Name	Common Name	S-Rank	Coefficient Conservation	Coefficient Wetness
<i>Juniperus virginiana</i>	Eastern Red Cedar	S5	4	3
<i>Kalmia angustifolia</i>	Sheep Laurel	S5	9	0
<i>Lactuca canadensis</i>	Canada Lettuce	S5	3	2
<i>Leonurus cardiaca</i>	Common Motherwort	SNA	---	5
<i>Lepidium densiflorum</i>	Dense-flowered Peppergrass	SNA	---	0
<i>Leucanthemum vulgare</i>	Oxeye Daisy	SNA	---	5
<i>Linaria vulgaris</i>	Butter-and-eggs	SNA	---	5
<i>Lonicera canadensis</i>	Canada Fly Honeysuckle	S5	6	3
<i>Lonicera tatarica</i>	Tartarian Honeysuckle	SNA	---	3
<i>Maianthemum canadense</i>	Wild Lily-of-the-valley	S5	5	0
<i>Maianthemum racemosum</i>	False Solomon's-seal	S5	4	3
<i>Melilotus albus</i>	White Sweet-clover	SNA	---	3
<i>Melilotus officinalis</i>	Yellow Sweet-clover	SNA	---	3
<i>Oenothera biennis</i>	Common Evening Primrose	S5	0	3
<i>Ostrya virginiana</i>	Eastern Hop-hornbeam	S5	4	4
<i>Pastinaca sativa</i>	Wild Parsnip	SNA	---	5
<i>Phleum pratense</i>	Common Timothy	SNA	---	3
<i>Pinus strobus</i>	Eastern White Pine	S5	4	3
<i>Plantago major</i>	Common Plantain	S5	---	-1
<i>Poa compressa</i>	Canada Bluegrass	SNA	0	2
<i>Poa pratensis</i> ssp. <i>pratensis</i>	Kentucky Bluegrass	S5	0	1
<i>Polygonatum pubescens</i>	Hairy Solomon's Seal	S5	5	5
<i>Populus balsamifera</i>	Balsam Poplar	S5	4	-3
<i>Populus grandidentata</i>	Large-tooth Aspen	S5	5	3
<i>Potentilla argentea</i>	Silvery Cinquefoil	SNA	---	3
<i>Potentilla recta</i>	Sulphur Cinquefoil	SNA	---	5
<i>Prunella vulgaris</i> ssp. <i>lanceolata</i>	Self-heal	S5	5	5
<i>Prunus pensylvanica</i>	Pin Cherry	S5	3	4
<i>Prunus serotina</i>	Wild Black Cherry	S5	3	3
<i>Prunus virginiana</i>	Choke Cherry	S5	2	1
<i>Quercus macrocarpa</i>	Bur Oak	S5	5	1
<i>Ranunculus acris</i>	Tall Buttercup	SNA	---	-2
<i>Rhamnus cathartica</i>	Common Buckthorn	SNA	---	3
<i>Rhus hirta</i>	Staghorn Sumac	S5	1	5
<i>Ribes cynosbati</i>	Prickly Gooseberry	S5	4	5

Scientific Name	Common Name	S-Rank	Coefficient Conservation	Coefficient Wetness
<i>Rubus allegheniensis</i>	Alleghany Blackberry or Common Blackberry	S5	2	2
<i>Rubus idaeus</i> ssp. <i>idaeus</i>	Common Red Raspberry	SNA	---	5
<i>Rubus odoratus</i>	Purple-flowering Raspberry	S5	3	5
<i>Rudbeckia hirta</i> var. <i>pulcherrima</i>	Black-eyed Susan	S5	---	---
<i>Rumex acetosella</i>	Sheep Sorrel	SNA	---	0
<i>Rumex crispus</i>	Curly Dock	SNA	---	-1
<i>Salix interior</i>	Sandbar Willow	S5	3	-5
<i>Sanguinaria canadensis</i>	Bloodroot	S5	5	4
<i>Saponaria officinalis</i>	Bouncing-bet	SNA	---	3
<i>Silene vulgaris</i>	Maiden's Tears	SNA	---	5
<i>Sonchus arvensis</i> ssp. <i>arvensis</i>	Field Sow-thistle	SNA	---	1
<i>Stellaria media</i>	Common Chickweed	SNA	---	3
<i>Symphotrichum lanceolatum</i> ssp. <i>lanceolatum</i>	Panicled Aster	S5	3	-3
<i>Symphotrichum novae-angliae</i>	New England Aster	S5	2	-3
<i>Symphotrichum pilosum</i> var. <i>pilosum</i>	Old Field Aster	S5	4	2
<i>Taraxacum officinale</i>	Common Dandelion	SNA	---	3
<i>Tilia americana</i>	American Basswood	S5	4	3
<i>Trifolium hybridum</i>	Alsike Clover	SNA	---	1
<i>Trifolium pratense</i>	Red Clover	SNA	---	2
<i>Trifolium repens</i>	White Clover	SNA	---	2
<i>Trifolium sp</i>	Trillium sp	---	---	---
<i>Trillium erectum</i>	Red Trillium	S5	6	1
<i>Tripleurospermum inodorum</i>	Scentless Chamomile	SNA	---	5
<i>Tussilago farfara</i>	Colt's-foot	SNA	---	3
<i>Ulmus americana</i>	American Elm	S5	3	-2
<i>Verbascum thapsus</i>	Common Mullein	SNA	---	5
<i>Vicia cracca</i>	Tufted Vetch	SNA	---	5
<i>Viola sp</i>	Violet Species	---	---	---
<i>Vitis riparia</i>	Riverbank Grape	S5	0	-2

